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CONTENTS.

An Asterisk (*) denotes an illustrated article.

EDITORIALS—

Briefly Told 321

"Municipal Ownership"—"The Position of Private Lighting Companies and their Relation to Cities and States"—Obituary Note—Mr. Thomas Sproull—Notes.

Fourth Annual Meeting of the Pacific Coast Gas Association—Official Report—Revised by the Secretary—Continued from p. 293 ... 322

Second Day—Morning Session—Water Gas, by Mr. Charles F. Adams—Discussion—Enrichment of Coal Gas, by Mr. O. M. Gregory—Discussion—Second Day, Afternoon Session—Wrinkle Department, Containing Description of Twelve "Wrinkles," with Ten Illustrations.

Special English Correspondence 331

An Association of Water Works Engineers—Present Position and Prospects of the Gas Industry—Two Papers at the North British Association.

ITEMS OF INTEREST FROM VARIOUS LOCALITIES 332

Improving the Herkimer (N. Y.) Plant—Welsbach Street Lighting, Baltimore, Md.—Proposed Gas Works for Ludington, Mich.—A Shareholder in the Rahway (N. J.) Company Wants an Accounting—The Amalgamation of the San Francisco Gas and Edison Companies—To Again Light the Pawtucket (R. I.) Railroad Depot with Gas—The Chelsea (Mass.) Company in New Office Quarters—The Gas Consumers' Association of Milwaukee—Betterments on the Capital City Plant, Des Moines, Iowa—Suing the Atlanta (Ga.) Company—Cheaper Gas for Ottawa, Canada—In the Matter of Assessing the Chatham (Can.) Company—A Successor to the Fishkill (N.Y.) Company—Assessing Franchises, St. Paul, Minn.—Experience of the Gas Light and Coke Company with Prepayment Meters—And Other Items.

Manufacturers Educating their Employees 334

The Problem of Economical Heat, Light and Power Supply for Business Blocks, School Houses, Dwellings, etc 334

A Simple Wiring Rule 335

Locating Pipe Obstructions 335

The Market for Gas Securities 335

BRIEFLY TOLD.

"MUNICIPAL OWNERSHIP."—A paper that attracted much attention at the meeting of the Pacific Coast Gas Association was presented and read by Mr. John A. Britton, the guiding genius of the Oakland (Cal.) Gas Light and Heat Company, and Secretary of the Coast Association as well. The paper discussed the subject of "Municipal Control," and its complete text will be found in our issue for last week. The author is peculiarly well-qualified to speak to this subject, for the authorities of Alameda have been more or less affected by and with the virus of municipal control in respect of their operation on public account of the lighting service of Alameda, and Alameda and Oakland are, or should be, virtually one, when it comes to any sort of public service. That Alameda did not gain much when it instituted a lighting supply and service on public account was very clearly and cleverly shown by Mr. Britton, in his argument thereon, which took the form of an open letter to the Trustees of the City of Alameda, in December, 1895, the full text of which appeared in the JOURNAL, for January 20th of this year. Apart, however, from any special application of Mr. Britton's arguments, his current paper has much that is apropos of the general situation in respect of the encroachments of municipal authority on the domain of private enterprise. Nor does this encroachment concern alone the field of lighting supply, for our paternalistic advocates are placing steady looks on the matter of trying for control of street railways; of course, we take it for granted that it is conceded that the water supply of any place should be under the control of the local authority, although we by no means admit that such control under the public results in more satisfactory service to the served than were the same governed by ordinary, everyday capital. But the particular branch of public service sought to be managed by authority of the State is neither here nor there, since there is no tenable reason that can be advanced to sustain the argument that the State should interfere or concern itself in the operation of anything which requires capital investment for its simple existence. Mr. Britton has a very concise way of putting things, as a rule; and we submit that his characterization that "Municipal Ownership" should be termed "Municipal theft," comes close to naming the matter truthfully and without redundance. The rotten constitution of the State of California, which can be traced to the concerted howlings of the Kearneyites of some years ago, is responsible for the turning away from that State of millions of dollars of outside capital which would, had it been guaranteed any sort of fair protection, have found fair return for itself in directions that the mere hinting at now even would be considered utopian. But despite "sandlotism" and its depressing influences, we will venture the assertion that the liking for fair play, which exists in some degree in everyone, will eventually smother the shoutings of the ordinary Californian advocate for putting things which normally belong to private enterprise in the demoralizing hand of the public servers for alms. Mr. Britton again hits the mark fair and square when he remarks "that the idle hand and irresponsible brain are pregnant with imagined wrongs, and from them come the agitations which move the foundations of government and society. * * * That one man or class of men should, by a superiority of brain power, rise to prominence or

wealth, seems to this child of jealousy unwarranted and unnatural. From the low depths of his intelligence it does not seem possible that one man should surpass another." But let the ignorant and the shallow-thinking shout as they may, one man will surpass another, and in 90 per cent. of the instances in which one goes on over his fellows, it will be found that it was hard plodding which enabled the one to go beyond the other—not luck, nor loafing. While we admit that the agitation of the subject of municipal control of enterprises that bear a strictly commercial appearance, is quite the thing just now, we have the belief that in the long run, common sense and reason will prevail; which means that as private enterprise, because of the moving life that permeates it, has hitherto been far in advance of public enterprise, so will it continue to rule. Mr. Britton is to be congratulated on the presentation that he made before the Coast Association of the gain that comes to a community through having its vital commercial affairs under the direction of men who pay the taxes rather than that the custody of such affairs should be in the hands of those who collect and squander the taxes so paid.

"The Position of Private Lighting Companies and their Relation to Cities and States."—This is the title of a pamphlet recently published by Dr. John Henry Gray, whose publisher is Gustave Fischer, of Jena, Germany. The author takes up 167 pages in treating his subject, divided into three set chapters and an appendix. He manages, too, to get the matter up in very readable style. Indeed, there is not a trace of dryness in his presentation of things that would of necessity seem other than romantic. He reviews the lighting question as the same exists in Paris and Vienna, and briefly, yet thoroughly, reviews and comments upon the relative advantages of municipal or private ownership of gas works. Although the Doctor seems rather to lean to the plan of municipal ownership, which ownership he nevertheless declares will be more suitable in the somewhat distant future than in the present, he unqualifiedly pays a high tribute to the conservatism and value of the course followed by the Massachusetts Board of Gas and Electric Light Commissioners, and lauds in no uncertain way the exceeding wisdom of the legislation which brought the Commission into being. He reviews the development and progress of the gas industry in this country in a decidedly breezy fashion, and in concluding his reference thereto again refers to the Massachusetts Commission by remarking that, "Besides its direct object, it also carries for the whole world a useful mission, through the vehicle of its grand scientific and statistic records." Dr. Gray's treatise is well worth reading, and perhaps some of our home publishers might find it profitable to render his lines into English for our easier mental digesting.

Obituary Note—Mr. Thomas Sproull.—"Mr. Thomas Sproull, for 36 years the bookkeeper and financial manager of Messrs. Herring & Floyd, and James R. Floyd & Sons, died in this city on Monday, the 24th inst., in the 78th year of his age. The cause of his death was exhaustion, resulting from the recent intensely warm weather. Up to within 10 days of his death he attended to business with the promptness and regularity which marked his conscientious devotion to everything acknowledged as a duty. Mr. Sproull was deeply interested in charitable work, and for 28 years never failed to conduct the religious services at the Friday evening meetings, held in the Colored Home and Hospital, 65th street and First avenue; on Sundays, too, he visited the patients in the Hospital. Few understood and sympathized with the colored people as he did, and his faithful interest in them was rewarded by their deep affection. In the change of business methods only the older members of the gas fraternity were brought into contact with and remember the erect form, clean-cut face and sparkling eyes of this vigorous representative of another generation; but to them, and to a large circle of the older New Yorkers with whom he was engaged in charitable work, his name will always be recalled as a recollection of a high ideal, well lived up to.—K."

Notes.—The Trustees of the Wheeling (W. Va.) city gas works are rather slow in completing the necessary plant improvements.——The Glendale Company is very desirous of securing a piece of real estate owned by the Easthampton (Mass.) Gas Company, but is not seemingly desirous of paying any too high a price for the coveted land.——Under the contracts for the lighting of the public buildings of San Francisco, Cal., which contracts are to run for two years, from May 1, 1896, the service is virtually divided between the San Francisco Gas Light Company and the Pacific Gas Improvement Company. The rate is $1.60 per 1,000 cubic feet.——The Directors of the Phœnix Gas Company, of Fishkill and Matteawan, N. Y., which concern has succeeded to the property and rights of the Fishkill Gas Company, are Messrs. F. I. Turner, R. L. Rees and R. H. Holland.

[Official Report.—Revised by the Secretary.—Continued from Page 293.]

FOURTH ANNUAL MEETING, PACIFIC COAST GAS ASSOCIATION.

Held in San Francisco, Cal., July 21 and 22, 1896.

Second Day—Morning Session.

The President introduced Mr. Charles F. Adams, of Portland, Oregon, who read the following paper on

WATER GAS.

Gentlemen—This is not a scientific treatise on the subject of water gas. In fact it is simply the recital of a series of experiences we have had in Portland. After the experience of having the fires under our coal benches put out by the unusual high water of June, 1894, the subject of water gas commenced receiving more than a passing notice by some of our people, for up to about that date oil had been quoted us at from 9 to 10 cents per gallon, which price precluded any idea of using it for making gas. In the following January our coal supply ran short by the delayed arrival of two ships from Australia, and the local dealers compelled us to pay them $10 per ton for coal; this last reason was the final straw that decided our Company to install a water gas plant, thereby adding another string to our bow, so that in case one gave away the other might perchance be of service.

Various forms and designs of apparatus were investigated, and their merits discussed in person and by letter with the different manufacturers; and, upon advice of our friends, we decided that, owing to the probable character of the oil it would be necessary to use in Portland, to take our chances with a Lowe type of a double super-heater; and in due time a double set was put in place by the U. G. I. Company, of Philadelphia. From the instructions covering the operation of the setting proper, it looked as if we were going to have smooth sailing in gas making, and that it would be unnecessary in the future to lose any sleep should a dark winter's afternoon find us with a small quantity of gas on hand and the electric light out of order. As long as the contractor's representative was in charge this idea was very good, but it was quite another matter after he left. Three or four days after the erector had gone the candle power dropped out of sight, the yield fell down to one-third the normal amount, and about as much oil came through the wash box as was pumped into the carbureter. This was a puzzle. The whole plant was carefully inspected and many hours were consumed in trying to solve the difficulty, when suddenly some one suggested that perhaps the heats were too low; this being corrected we went on our way rejoicing, satisfied that there was little else to learn about making water gas. This conceit was very soon taken out of us, once for all; for the following evening it was reported that the whole plant was on fire, and burning up. Sure enough, the whole place looked as if Satan had been turned loose, lampblack was scattered all over the floor and yard, the seal pots were full, the take-off pipe and wash-box choked completely, and the whole apparatus was roaring like a thousand devils. Our superintendent remarked that we had indeed drawn a prize—a gas machine, a tar and a lampblack plant all combined. After ten hours of wet blankets, in the shape of steam, we were once more in shape. The manufacturers' instructions in regard to the character of heats in the various shells were scanned and, after being thoroughly mastered, the fiat went forth that if they varied so much as a hair's breadth from the standard shades there would be trouble. From that time we commenced to get better results, but the trials and tribulations we appeared to have were more than we cared to put up with. The gas makers had to increase the size of their trousers on account of the development of leg muscle caused by running up and down stairs to watch the heats, there being a white-red for this and a bright-red for that shed, a dark red for this and a red red for something else—all in the proper places; and yet we had stoppages, lampblack and blowouts, clinkers in the generators, so large that it was very difficult to handle them, and whether coal or coke were used, the results were still the same. So it is not difficult for you to understand that we knew little about running a water gas plant. Of course, you who are old hands at this method of gas making can smile and attribute our troubles to gross ignorance and carelessness; well, admit all that, nevertheless our troubles were real ones.

At our suggestion, the manufacturers sent one of their engineers to give us more instructions, who, after making a careful survey of the conditions surrounding our plant and the method of operation, asked to make some slight changes in order to test a pet theory of his own, which was an "excess of steam and high heats," the orthodox rule be-

ing "never admit an excess of steam, etc." Theory or no theory, we were perfectly willing to try anything for a chance to get better results and more sleep; and while we are not learned enough to state which is the proper creed to follow, still we can say that, by allowing Mr. Papst to use his own judgment, we soon found that high heats, with an excess of steam, gave better results in more than one direction than had been made at our station before. By carrying higher heats the make per run is increased, the tar and water leave the seal pots at a higher temperature, and the precipitation of the tar in the separator is more rapid and complete, the coal results not increasing. The excess of steam appears to envelop the oil so that the very hot checkers do not destroy the lighter hydrocarbons, and then more candles are developed per gallon of oil used. The bricks in the fixing chambers are kept cleaner and the large clinkers in the generator disappear. The linings look very well after months of use, and instead of cleaning the checker bricks every three months once a year would be sufficient, if the gas makers used care.

We have used Welsh coal, gas house and oven coke in the generator; Peruvian oil 36° B., Los Angeles 15° B., and, by mistake, a barrel of tar. The apparatus appears to swallow it all and make gas. We can't swear as to how much gas the tar made; but we do know it was sworn at sufficiently.

The setting was not designed to use oil as heavy as the Los Angeles, although at first it handled this grade as well as the lighter oil; but the large percentage of asphaltum or heavy tarry residue soon asserted itself, and we had stoppages and seal pots overflowing the stickiest slime one wanted to see. A heavy deposit of carbon appeared on the take-off pipe in a few hours after cleaning. By raising the sides of the seal pots six inches above the overflow and placing a hand pump in each, with an outlet to separator, it only requires a few strokes by the boiler tender every half hour to keep everything clear around the wash box. Increasing the take-off pipe from 10 inches to 14 inches gave the gas a freer passage from the superheater. With these changes the set handles the 15° B. oil just as well as the lighter grade; at least that is our experience up to this date.

The following are about the average results: The candle power was taken three or four times each day over a 60-inch Hinman's photometer with an Edgerton standard. The apparatus is a 5 foot setting. The Peruvian oil entered the carbureter at about 400° F. In using the Los Angeles oil it was passed through a Jones' heater before entering the regular coil in the take-off pipe, and reached a temperature of about 525° F. to 600° F.

Oil and Coal.	Gals. Oil per 1,000.	Lbs. Generator Fuel.	Candle Power.	Candles per Gal. Oil.	Make per Run. Cu. Ft.	Hours Running
Peruvian, 36, gas house coke.	5.09	55.3	25.4	5.0	2,724	14.3
" Welsh coal....	4.36	39.6	27.6	6.3	3,081	13.2
Los Angeles, 15, "	4.6	39.6	26.0	5.6	2,685	18.9
Mixture, 20, "	4.11	4.03	25.9	6.2	3,154	13.2
" "	3.8	35.3	22.0	5.8	3,629	
Average results 9 months..	4.54	45.4	27.0	5.9	2,771	

The generator fuel is probably too high. Up to this date we have been unable to keep the setting running the full 24 hours, but as the season advances we expect to show better results in this direction.

The greatest difficulty we are confronted with to day is the uncertainty of securing oil of a proper quality at a price that will warrant the making of water gas at Portland. We started our plant with Peruvian oil from the ill-fated "Bawnmore," whose loss, with that of the "Mineral," makes us feel as if we must give up this branch of the business altogether, as it seems almost impossible to pay the railroad freight on California oils.

Discussion.

The President—Mr. Adams has certainly had a bitter experience in the manufacture of water gas; but it seems he has overcome his difficulties. As I understand it, he has been using an apparatus of the Lowe type; but to put Los Angeles oil into such an apparatus is like trying to clean a microscope with oily waste. I am glad to hear, however, that Mr. Adams has succeeded in introducing the low grade oils into water gas with success.

Mr. Eichbaum—When our apparatus was first started it was no doubt designed for high gravity oil. At that time we had no high gravity oil to put into it, and the young gentleman in charge of the apparatus put the oil in without anything to separate or divide or cut it up. I don't like to say anything against the apparatus at all, but truth compels me to state that in 24 hours the ashpit was full of oil and our top layer of brick and mortar entirely disintegrated. Having other apparatus on hand we did not run it in that way any longer, but we put in a steam spray, just as we had been using for the last ten years with other generators, and with that we have had no trouble at all. We have been running the apparatus right along since then with fairly good results. The first difficulty to arise was, that on account of the heavy gravity of the oil it was necessary to put so much in the generators. We had to divide the oil in the superheater. That would not answer, until we cut up the oil in some way, because the oil going in in a sufficient body to make the gas give the proper candle power went in with too much force, and would not divide at all. It plunged right through the whole bed of fuel. By using this spray we got rid of the trouble. The main difficulty that I see in using the heavy oils of from 17 to 20 gravity is the extreme thickness of the tar that comes from it in making gas. If it chills you might just as well have the outlet pipes in a bed of concrete as in a bed of that tar. I think our experience did not last over 24 hours, and we are getting along very nicely. We have now been running about four months, I think, and have no complaint to make so far. I would like very much to hear from those who have been using the heavy grades of oil, to know how they are getting along with them. It is my opinion that the older style of water gas apparatus is probably more profitable than the superheater apparatus.

Mr. Osborn—I think probably Mr. St. Clair, of Bakersfield, can give us some experience on the question of a water gas plant.

Mr. St. Clair—No; I haven't any experience. We are using the light oil, and we have not used any heavy oil at all.

Mr. Cline—We have had but very little trouble. During the winter time we had a stoppage from carbon in our superheater, but during the summer time we had no difficulty in using the 17° oil. If we do, we simply open the generator and let it burn out. If we had only one generator we would not be able to do that; but as we have three generators we can do it. Taking the asphaltum out of the crude oil leaves it about 17°. We bought crude oil of 16 gravity direct, and mixed it in with oil coming from Santa Paula, of about 22 gravity.

Mr. Crockett—I would like to ask Mr. Cline how many gallons of that oil he uses to the thousand feet.

Mr. Cline—I think we are running now something like from 5 to 5¼ gallons. In taking out heavy oil we screen it before it goes into our tank to get the sand out, and that is all included in the 5 to 5¼ gallons of oil per thousand feet made.

Mr. Britton—What proportion of Los Angeles oil do you mix with the other?

Mr. Cline—All kinds of proportions. If we find the superheater stopping we buy a little distillate and put it in with the other in the tank and go right on using it.

Mr. Britton—How do you mix it?

Mr. Cline—We have a small agitator that we keep running. It keeps the oil running over and over. We have a steam coil which keeps the oil pretty well heated up, and we don't allow it to cool. Perhaps that is one reason we have no trouble with it. We charge to the water gas all fuel used for that purpose.

Mr. Collins—Can you use in your apparatus the same oil, without changing the conditions, when the oil is introduced and make it as handily?

Mr. Cline—Yes, sir.

Mr. Collins—Have you the same results coming from the use of all the oils?

Mr. Cline—Yes, sir.

Mr. Collins—Those are the results you get from the 17° B. oil, as I understand.

Mr. Cline—Yes, sir. Our gas is about 20-candles, and we make about 20,000 feet a day of coal gas. The photometer tests show on the mixed gas.

Mr. Collins—The apparatus used by Mr. Adams was built without any experience at all with California or Peruvian oil, and of course all of these troubles had to be taken care of when they came up. Mr. Adams was very unfortunate in his experience, but, now that oil is better understood, I don't think that the apparatus in this case and in other cases works very badly. It seems to me that the double superheater form works very nicely. You can carry the heat necessary to take care of the oil at the proper place. It can be done better in that form of apparatus than in a form where there is but one shell. I think the results now had are equal to any gained in any other form of apparatus.

Mr. Cline—We have a single shell—it was originally built as a Springer generator—and is 10 feet in diameter and 36 feet high.

Mr. Powers—I assume a good many gentlemen here are not scientific, who have but little knowledge of symbols, and who are more interested in the financial part of the question. I think that this paper

and the remarks thus far made upon it furnish a very important lesson; one that ought to pay us for our attendance upon this meeting. The conclusion I draw from this is that a small gas works, making we will say from 30,000 to 60,000 feet of gas per day, has but very little trouble with coal gas. That is the kind of plant we want to stick to. In large plants, like those at Portland, Los Angeles or San Francisco, I believe an auxiliary water gas plant is a good thing. It requires a scientific man to run it; also a man with a great deal of patience. Our company started on oil gas, and had some trouble. We put in a coal plant and it never has given us much trouble. We put in a water gas plant and we had all of these experiences without having the scientific knowledge to run it properly. From the reading of this paper, and the remarks made upon it here, I might, therefore, say to those who are interested in the financial end of this question, that in a small coal gas works we can depend in a measure upon the cost of our product. The price of coal does not vary like the price of oil and purifying material, and we do not have the various annoyances in operating it. I have been asked the question, by many having small plants in the southern part of the State, what I thought of a water gas plant. I think it is a valuable auxiliary to a large plant, but where you make only from 30,000 to 60,000 feet per day, I think it would be better to stick to the coal gas.

Mr. C. M. Converse, of San Francisco—We have not been able so far to successfully carry on our experiments at the Potrero in injecting and spraying the heavy oils into a generator without the aid of steam. Our chief difficulty was in not being able to sufficiently heat, or rather vaporize, the oil, but we have just completed the erection of an apparatus which will enable us to thoroughly vaporize it. Our oil heater was not sufficient, but since we put in a new one we are getting the oil up to a high temperature before introducing it into the generator, and I think we are going to do very well; but I cannot give you any results as yet. We are still using the steam spray. I shall at once continue the experiments, and I hope to succeed in injecting and spraying the oil without the aid of steam, and by so doing make a considerable saving in oil.

A vote of thanks was here tendered to Mr. Adams for his very interesting paper.

The President—I would like to state that a great deal of interest is in evidence over our proposed exhibition of the Roentgen ray and of acetylene gas. Many members would like to know the time set for these exhibitions, and if there be no objection we will fix the hour for 3 o'clock for them.

Mr. O. M. Gregory then read the following paper on

ENRICHMENT OF COAL GAS.

An Irishman was tightening his saddle with the horn toward the horse's tail, when a friend came along and said, "Hey, there; you are getting that saddle on the wrong way." Mike replied, "Oh, now you go on; you don't know which way I am going."

While endeavoring to outline the scope of this paper, and to determine the direction in which to look for information, the author failed for some time to find which way he was going. A review of both theory and practice of all the different methods of enriching coal gas, from the time of Murdoch down to the present, seemed to be in order; but that job will keep for some time. While it is ahead of us, we will always have something to do. By writing up experiences in San Jose only there will be no danger of exhausting the subject, and the hope is entertained that what is now said will be the forerunner of experiments and literature enough to enable the manager of a coal gas plant, who has no oil gas plant in operation, to enrich with something cheaper than shale.

Like Rory O'Moore, to get the benefit of the "luck in odd numbers," we will place, in each case, the work of three months together, and show the results of three months' enrichment with shale, three months' with gasoline, and three months with petroleum oil. That will make nine months in all. If a man cannot show what he can do in nine months, there is something wrong with the works.

Beginning with the shale, the amount carbonized was 1,064,680 lbs. of shale and coal, of which 80,380 lbs., or 7.55 per cent. of the mixture, was shale, producing 5,212,300 cubic feet of 17-candle power gas, which is a yield of 4.89 cubic feet per pound of the mixture. The shale cost $25.25 per ton, including freight, making a cost of 17.39 cents for each 1,000 cubic feet enriched. Other coal might require more or less shale according to quality and heats. We ran the works on a sample of Hetton coal for 15 days without any enricher, and kept about the same candle power and yield as above.

Of course we could have used less shale with the Wallsend above mentioned, by lowering the heats and making a richer gas from the coal itself; but that would reduce the yield and be an extremely doubtful gain.

There are some coals that, when coked with a high heat, produce a high yield and a poor gas, yet can be, to all appearances, coked thoroughly at a moderate heat and give a good yield and a good gas without an enricher; but since we are living in the days of high heats and high yields, we must keep up to date and continue our search for an ideal enricher.

We will now see how San Jose got along for three months with gasoline as an enricher.

We placed a 60-gallon tank, having a long glass gauge on it, to see how many gallons we used per hour, above the gas pipe, where it leads from the hydraulic main and takes a downward course, and allowed the gasoline to run from this tank in a continuous stream into the hot gas at the rate of about 1½ gallons per hour, occasionally examining a drip near the exhauster to see if the surface of the water there remained free from gasoline, as a proof that we were not using more than the gas would take and hold in suspension. By working for a few days with high grade we found that any amount of 87° gasoline we might have occasion to use would be thoroughly taken up by the gas, with no danger of being precipitated; but 7 cents more on the gallon had the effect of thoroughly precipitating the idea of using it. We then bought what is called 74° gasoline; but which, by-the-way, shows only 70° on that Beaume's scale for coal oil. It would be better if this grade had a tendency upward in its variation of 4°, as has the higher grade—that sold for 87° showing 90° on the scale—but it shows only 70°, and we have to take some care that we do not admit more to the main than the gas will absorb.

We destructively distilled 1,331,452 lbs. of coal and gasoline, of which 17,452 lbs., or 1.33 per cent. of the mixture, was gasoline, producing 6,172,700 cubic feet of 17-candle power gas, which is a yield of 4.63 cubic feet per pound of the mixture. The gasoline, at 14 cents per gallon, cost $421.26, making an expense of 6.82 per 1,000 cubic feet of gas enriched, or 10.57 cents less per 1,000 than when we enriched with shale. The yield of the gasoline and coal, however, was .26 of a cubic foot per pound less than was the shale and coal, and 216 pounds made 1,000 cubic feet.; therefore, the loss was 216 times .26 cubic feet, or 56.16 cubic feet. This divided by 4.63 will show the number of pounds of coal we must add to make up the loss, which is 12, at 3-10 cents per pound, making, in round numbers, 4 cents to subtract from the original gain of 10.57 cents, leaving an actual gain of 6.57 cents per 1,000 feet of gas made. Suppose we were making only 60,000 cubic feet per day; in 30 days we would save $118, not to mention a saving of from $10 to $15 per month in cost of purification, which, I understand, is to be added to each superintendent's salary who will save $100 per month for his company in the manner above described.

It may be said that the shale and coal will, under some circumstances, produce better results, as I have seen it do; but it can also be said that when the oil companies furnish the grade of gasoline we pay for, the gasoline will produce better results, as it yielded 4.95 cubic feet per pound of the mixture during the month of June from gasoline that let the hydrometer down to 74° and over.

A few years ago, before we knew how to use gasoline as an enricher, we ran short of shale; but we had petroleum oil on hand, though we had no cartridge shells to fill. So we took sawdust and thoroughly saturated it with oil, and filled old sacks, costing 1 cent each, about one-fourth full, and wrapped the remainder of the sack around, making neat bundles containing a couple of gallons of oil each, and threw one in each retort, just after the last shovelful of coal was thrown in. In this way, during three months, we distilled 971,220 pounds of coal and oil, of which 33,880 pounds, or 3.49 per cent. of the mixture, was oil, producing 5,034,700 cubic feet of 17-candle power gas, which is a yield of 5.18 cubic feet per pound mixture. The oil cost $409.62, including sawdust and sacks, making a cost of 8 cents per 1,000 cubic feet of gas enriched.

Thus it may be seen that oil at 7 cents per gallon enriches and gives a good yield; but it puts on too much pressure and seems to open the cracks in the retorts. Putting it in cartridges did not give much relief from pressure.

Some writer has suggested to put the cartridge in at the third hour, as the heat of the last hour is all-sufficient for the oil, and the cartridge shells, which are made of iron, will last much longer.

I want to suggest that we turn our attention to the very simple method of using gasoline as an enricher, and get specially low rates with oil companies for a gasoline which is never less than 74°, in consideration of a great increase to them of trade. Even though we buy a small amount amount at a time, the use of 30 to 40 gallons by each gas works per day,

Sundays included, should not be allowed to pass without due consideration, as it counts up like a high rate of interest on a good many amounts. We get it in small quantities because it is difficult to keep it from evaporating, and, as for accidental explosions, the less we have on hand the safer we feel.

Discussion.

The President—Gentlemen, the question of enrichment of coal gas has always been an interesting one, but it is becoming doubly so from the fact that at the present time almost no Australian shale coal is imported here. In fact, I might say none whatever. We have, therefore, been reduced to the experiment of enriching with oil.

Mr. St. Clair—I one time introduced gasoline as an enricher between the scrubber and the purifier. I would like to know how Mr. Gregory does it.

Mr. Gregory—We set up a tank above the hydraulic main and allow the gasoline to continue in a downward course until it reaches our gas main, between the hydraulic main and the exhauster. At the drip we noticed whether we were using more than necessary to hold it in suspension.

Mr. Crockett—Did you find the candle power to be kept up all over the city during that time; or did you find it better in some places than others?

Mr. Gregory—I found no trouble at all. The 87° gave a pure white light and everybody liked it. While the 74° seems to remain in suspension all over the city after it once gets out, it seems to surprise a person how much of it the gas will take up and hold.

Mr. Crockett—What is the cost of the enriching?

Mr. Gregory—Six cents per thousand when enriching with 74° and the other was eight cents per thousand. The shale was a great deal higher—over 17 cents.

Mr. Eichbaum—This whole subject of enriching with gasoline has been tried very extensively in Europe. You will find very full reports in the American Gas Light Journal lately respecting its efficacy. They sprinkle the benzine into the main, and it seems to have done very well there. From my experience what will do in this country will not do in others. As it might be interesting, I will relate it. I think it was during the year 1858, at the place I was then located, we put gasoline into the gas, and while we found it was very good around the works, when the thermometer was about 10 to 20° below zero, people at the extreme end of the line had hardly any light at all. They did not even get the light that belonged to the coal gas unenriched. It seemed as though the gasoline took the illuminants out of the coal gas. It was so unsatisfactory that the process was discontinued. I think the apparatus was probably taken out and never used any more.

Mr. Osborn—I have retorted considerable oil. If, instead of waiting until the heat is highest, you run off the oil when the coal is first charged into the retort, it will work all right; but if you wait until your heat is highest, the oil seems to cake up at the hottest point in the retort covered by the pipe. It will cake up and cause a back pressure, and you cannot get the oil into the retort. I have before now tried to see if the oil would run through all right. It would be going apparently all right before I put on the lid. I then tried to run the oil through when the charge was nearly worked off, and I found it stopped up. The heats were too high. I find the great disadvantage in using oil shows in the standpipe. Something stops the standpipe up solid, like rubber, and it is very hard to get at. I found that it was cheaper to enrich with paraffine oil such as we have here. I have used it successfully. When I could not obtain that I tried the Los Angeles oil, and we could not use it at all. It would not run out of the pipe. I would like to use oil again, and if anybody can tell me how to keep it from stopping the standpipes up with an oily gum, I shall be glad to know it.

Mr. Gregory—Putting it in with sawdust will prevent its stopping, but it is an odd makeshift, and I would not desire to recommend it to anyone.

Mr. Osborne—The chances are that the sawdust would cause it to go off with a flash. I once threw in a cartridge in a live retort, sealed it, and waited for a moment for the flow of gas. The experiment blew out the scrubber seals and everything else. I think it would be about the same with the sawdust. You must have it going gradually. It should go in by gravity.

Mr. Gregory—When I put it in the coal was cold. The heat was not great, and it mixes with the coal gas as it comes out. It must come out in the form of vapor, and it is cooked out like your coal. You cannot cook up your sawdust quickly, because you cannot cook gas out of your coal quickly.

Mr. Parker—I would like to ask Mr. St. Clair what it was that caused him to introduce the enricher between the scrubber and the purifier.

Mr. St. Clair—The idea was suggested by the hope that I could use some of our Kern county product. I got a carload of asphalt, from which I obtained a very fair yield of good gas. I used a couple of carloads of it, and thought I was attaining good results and making a good amount of money; but I finally found the pipes were stopping up, and, as a remedy, I put in gasoline. We paid rather dearly for our experiment with the asphalt.

A vote of thanks was tendered Mr. Gregory for his paper.

The Association then took a recess until 1:30 P.M.

SECOND DAY—AFTERNOON SESSION.

The Association reconvened at 1:30 P.M. The President announced that Mr. Parker, the Editor of the Wrinkle Department, would occupy the attention of the Association.

WRINKLES.

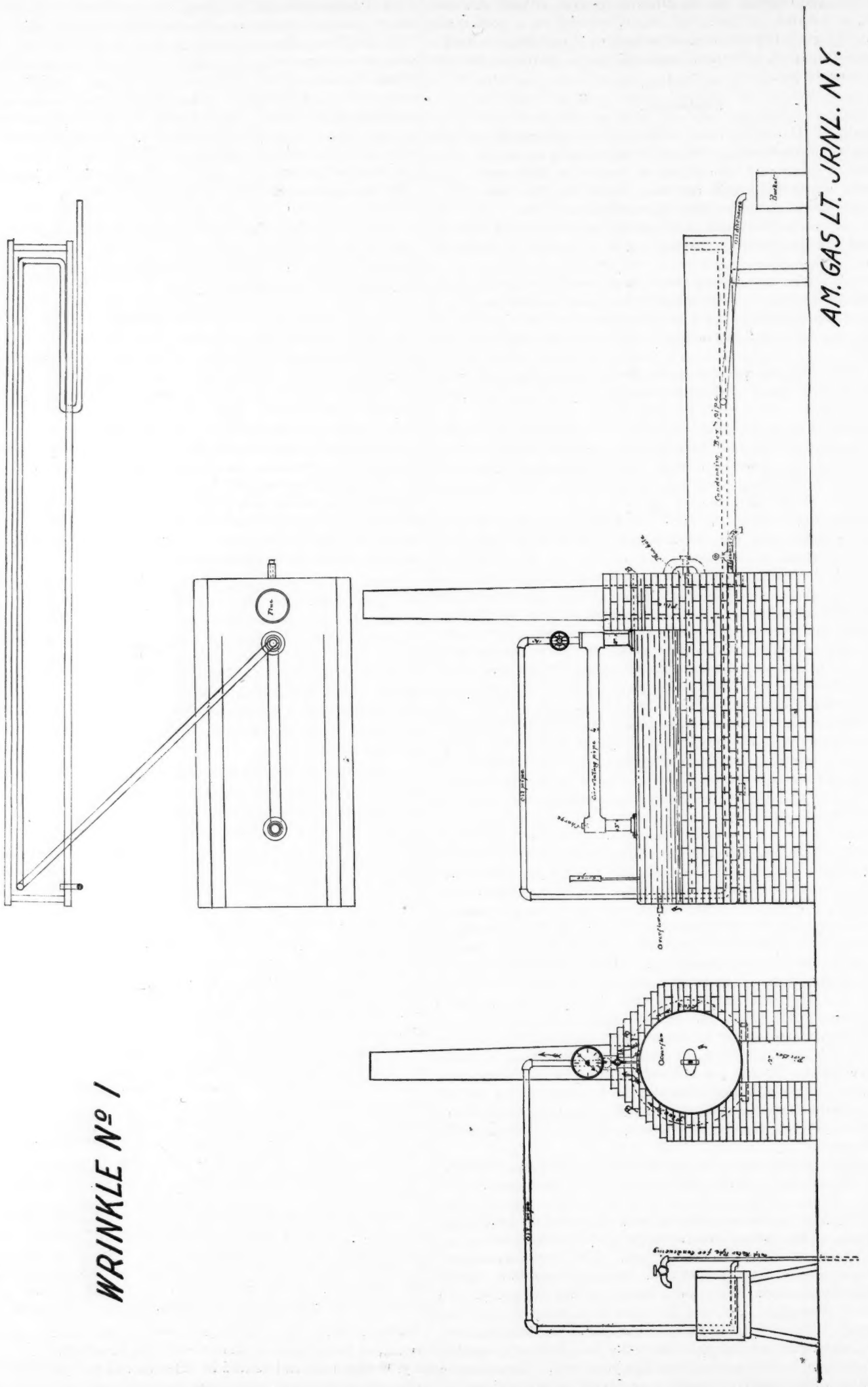
Mr. T. R. Parker—Mr. President and Gentlemen: The results of gleaning interesting subject-matter for the "Wrinkle Department" this year have depended entirely upon the efforts of the several members who have contributed to the substance of this edition that I have to submit to you at this time. In my experience I find a diffidence among members in bringing forth what are considered the small conveniences, the handy contractions. These somethings that afford gratification and satisfaction, as well as enjoyment, to those who conceive, but are thought too insignificant to present to or be received by the fraternity comprising this Association; and, consequently, are held back, or remain to be uncovered from their concealment by a personal inspection from the party whose duty it is to gather and compile material for the Wrinkle Department.

Wrinkle No. 1 (see cut, page 326).—The contribution from Mr. Wylie, of Carson, Nevada, is essentially a wrinkle in the matter of increasing the revenue to works similarly situated. It consists of a still for converting tar into pitch by evaporating and condensing the essential oils and volatile matter. The pitch he finds ready sale for among farmers and miners for sluice boxes, tanks, troughs, etc. He regulates his heat by the flow and quantity of oil from the still, and uses the pressure gauge to indicate possible stoppages in condenser. The oil is converted into gas in the usual manner, but pitch seems to be the article desired.

Wrinkle No. 2.—One of the points that a painstaking superintendent aims at is neatness, cleanliness and order, and anything tending in that direction is most acceptable, and wrinkle No. 2 is a step in that direction. It reads: *An Ink for Recording Gauges.* I suppose no gas works, however small, is without at least one recording pressure gauge. In some the records are kept in ink, and carefully filed away, so that the street pressure, for instance, of the past day or week, or whatever else the gauge is watching, can be seen at a glance and any irregularities corrected. On the other hand, I have known of many records kept in pencil, the mark being erased every morning and the same sheet replaced until eventually it falls to pieces. For obvious reasons ink is preferable to pencil, and I would suggest the use of a simple homemade ink which I have been using for the past year and a half, with no more trouble than the old-fashioned pencil. After some little difficulty over a pencil sheet (an attempted erasure to hide a bit of carelessness) we adopted ink in the gauge. At first I tried the ordinary carmine office ink with indifferent results. It was supplied in the usual way, in a glass tube drawn to a point. I was obliged to fill this tube every morning. The ink was so fluid it would run down the sheet or soften it so that the glass would catch and tear it as the drum revolved. At last I hit upon a plan which works admirably. A little glycerine, colored with an alcoholic solution of fuchsine or any other aniline coloring matter, has about the right viscosity and does not soften the paper.

Once the glass tube is filled with this, it will last about three months on our street pressure gauge, where formerly it was filled every morning. I supplied a Draper barograph with a tube full of this ink March, 1895, have kept a faithful record ever since, and, up to date (June, 1896), the tube has not been refilled. Anyone can make enough of the ink in five minutes to last a lifetime.—J. BRYANT GRIMWOOD.

Wrinkle No. 3 (see cut, page 327).—A very novel expedient was adopted, at the Potrero Station of the San Francisco Gas Light Company, to attain the end desired in the matter of an hydraulic lift. The elevator is used to hoist coke into a separator and as a coal lift. The total lift required was 35 feet. The well borer struck a boulder at 24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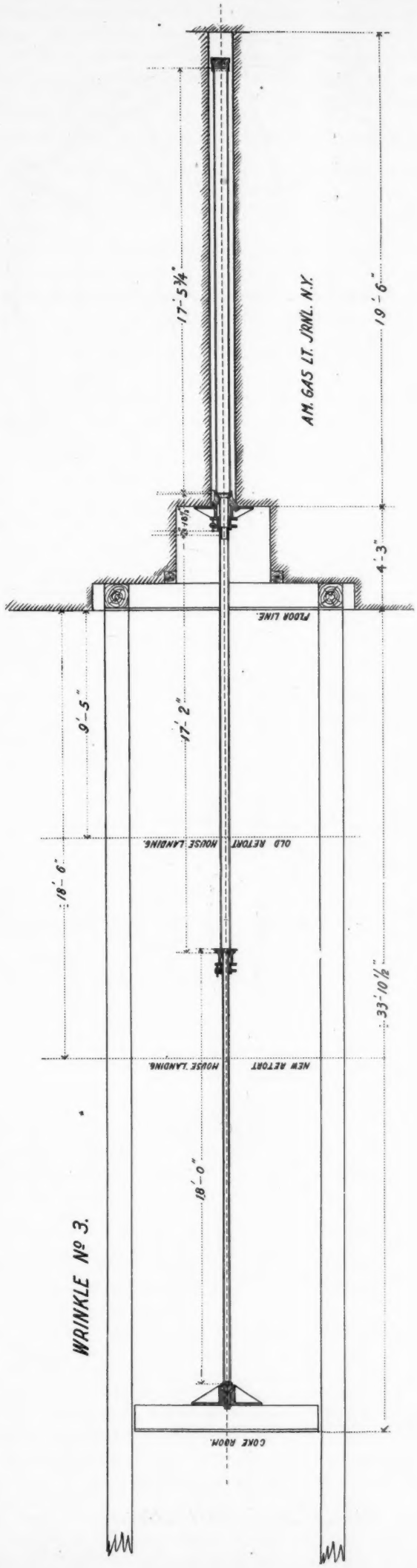
WRINKLE Nº 1



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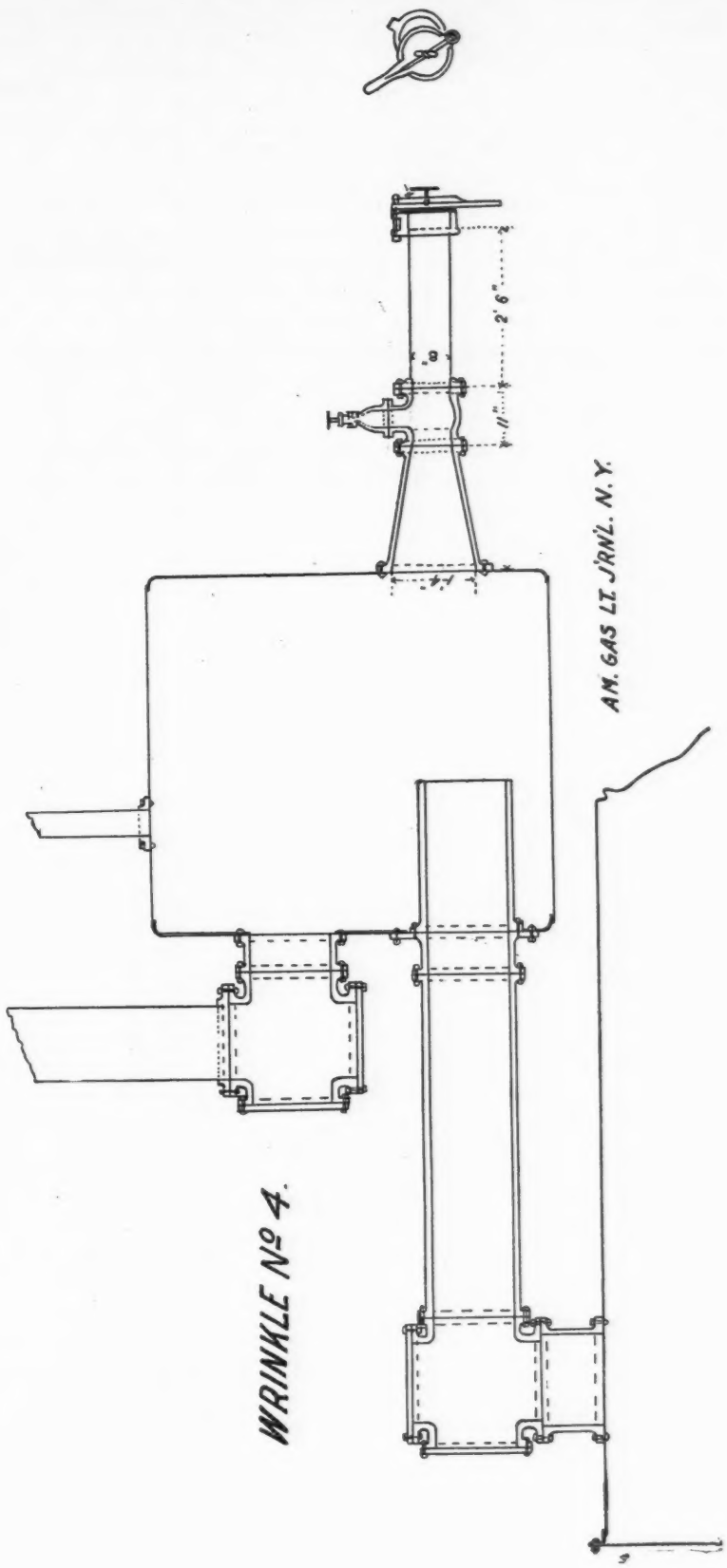

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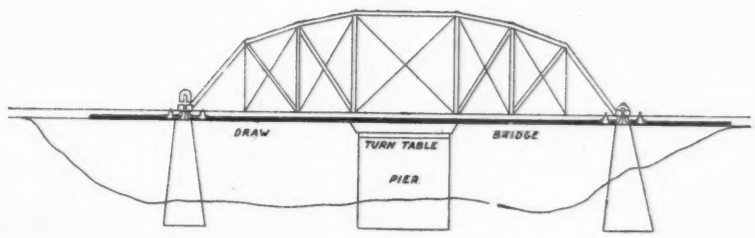

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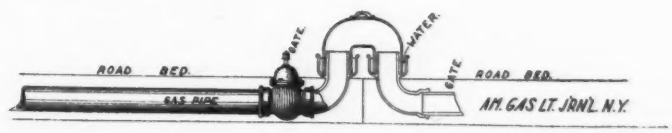

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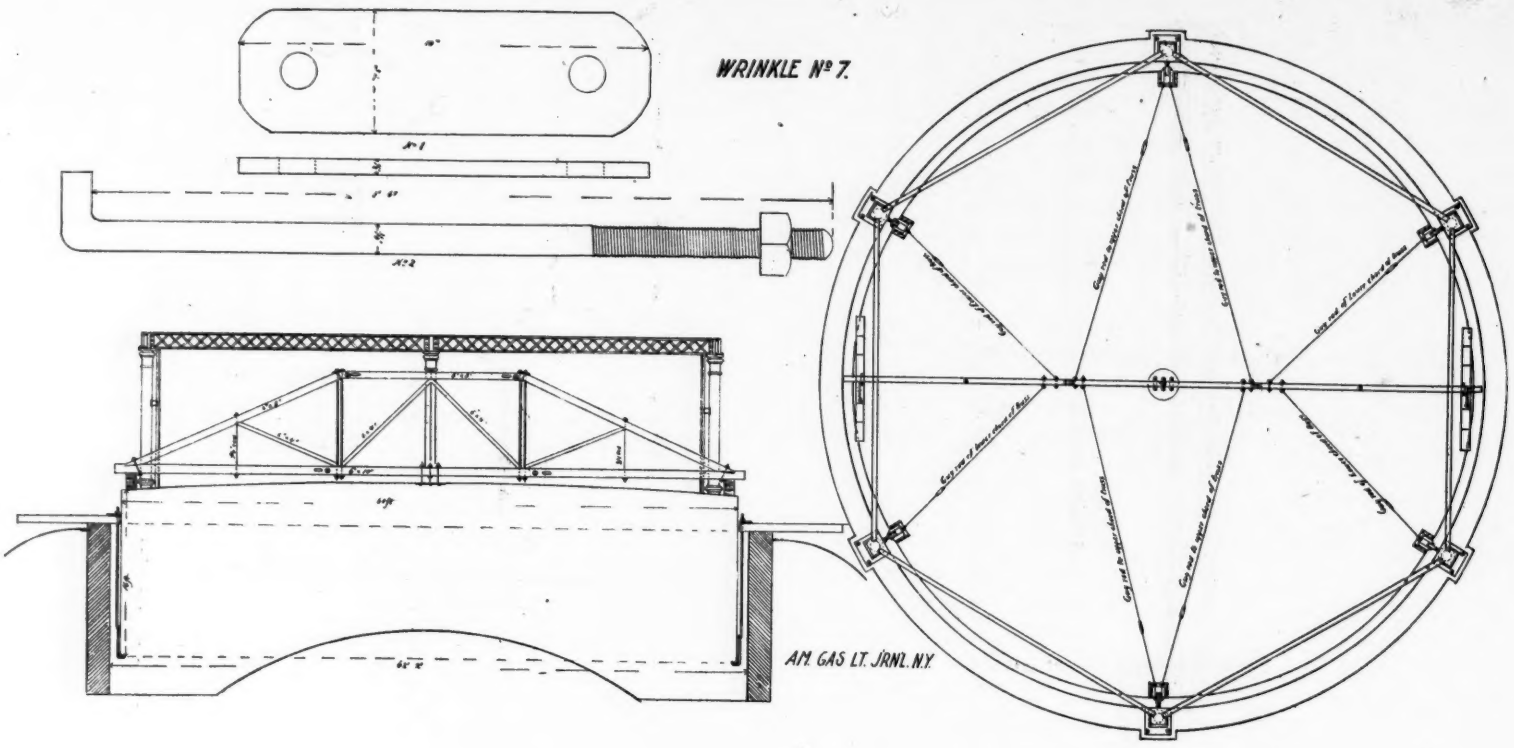

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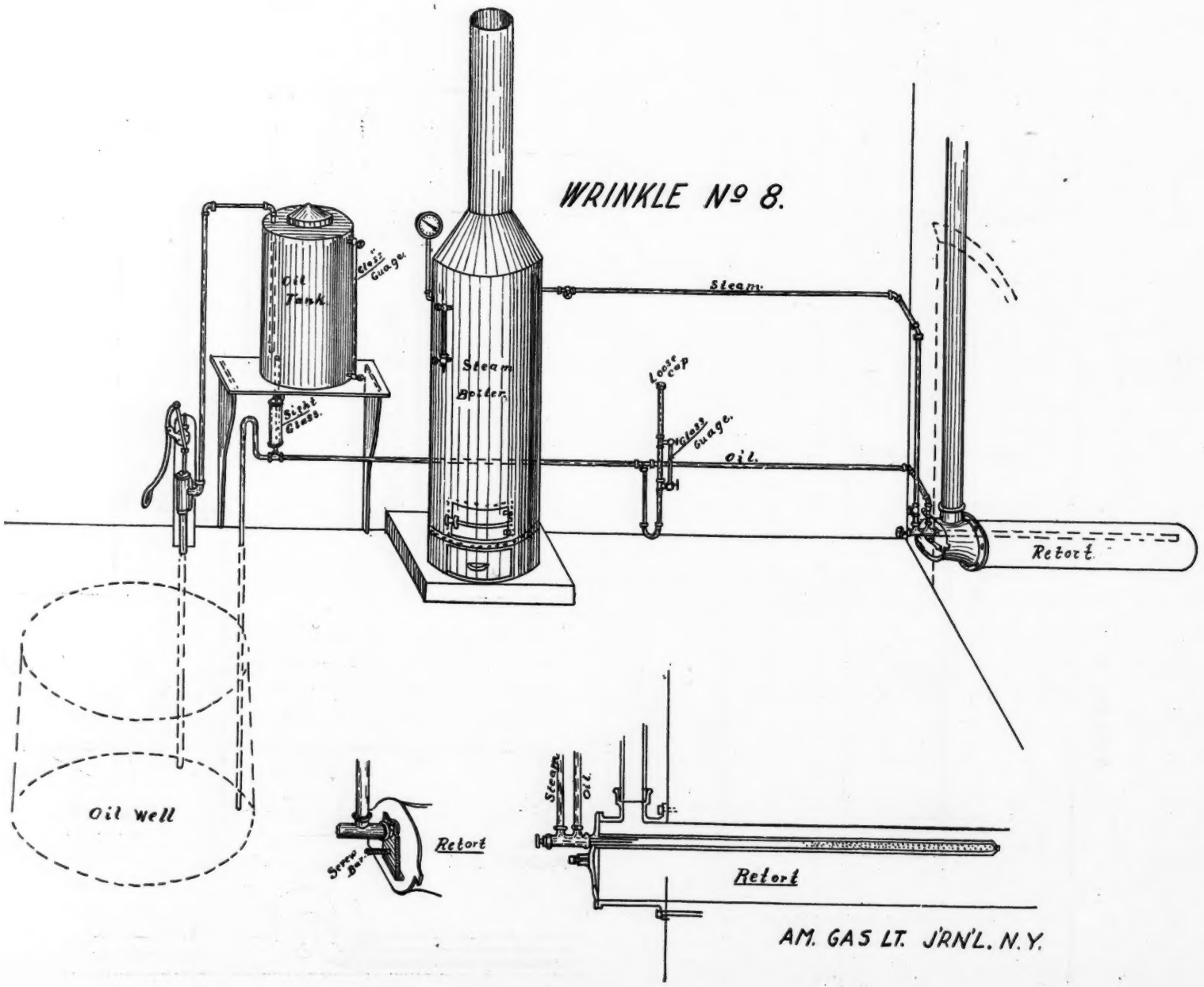


feet which could not be removed nor drilled, and blasting could not be resorted to, on account of the close proximity to the foundation of the building. To overcome this difficulty, a telescopic elevator—*i. e.*, one piston working inside of another piston—was designed and constructed, and has been in successful operation several years, giving perfect satisfaction. This kind of an elevator will be found quite convenient in case of obstinate obstruction being encountered at a depth less than the lift required. This is respectfully submitted by Mr. Richard Fenner.

Wrinkle No. 4 (see cut, page 327).—A very simple and efficient device is shown as Wrinkle No. 4 for drawing off the heavy deposit (which accumulates in seal vessels of gas generators) without stopping gas making.

No. 1 is a funnel shaped casting with a flange on each end. The upper end is 16 inches diameter, and rivited to the bottom of the seal box. The casting is 24 inches high, with an opening of 8 inches on the bottom, to which is bolted a single 8 inch gate valve. Below the 8 inch gate valve, and bolted to it, is a piece of 8 inch pipe, 2 feet 6 inches long, on the lower end of which is a gate, with a handle on the side for opening and closing.

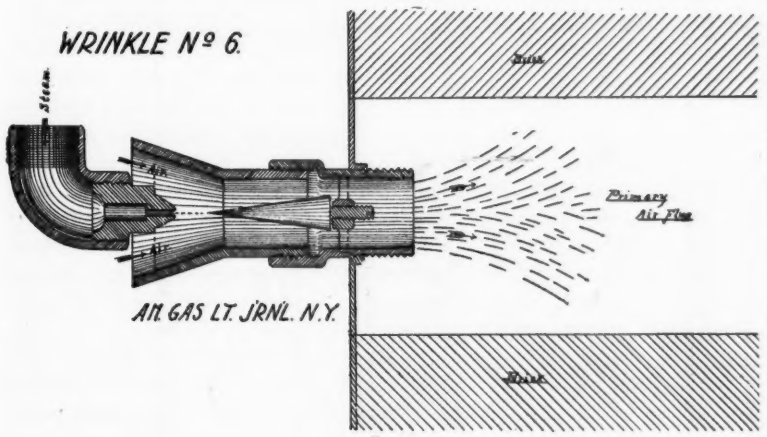
When drawing off the heavy deposit, close the lower gate and open the upper gate valve. This will allow the deposit to fall through to the lower gate. Then close the upper gate valve and open the lower gate, when the deposit will fall into a vessel placed to receive it.—W. B. CLINE.

Wrinkle No. 5 (see cut, page 327.)—The application of an old idea to a new service is shown in Wrinkle No. 5 as in use, conveying gas from one gasholder to another, on opposite sides of the Williamette river, Portland, Oregon. The cut explains itself. Seal cups filled with some slow evaporating or heavy fluid, with shut-off valves convenient, a straddle or dip pipe to complete connection, supplies gas sufficient for all requirements, taking advantage of crossing on a drawbridge and avoiding the inconvenience of a shifting river bottom and periodical floods. It has, I understand, done good service for a year or more.

Mr. Sherman, can you tell us the author of Wrinkle No. 5?

Mr. E. F. Sherman—Mr. Slater got it up, I believe.

Wrinkle No. 6 (see cut, page 329.)—The application of forced draft by steam in primary air flues is not new, but the adoption of the device in



Wrinkle No. 6 is for the purpose, and fills the requirements nicely with but little expenditure of steam, the small cone spreading the blast and producing good results.

Wrinkle No. 7 (see cut, page 328.)—The ingenious plan adopted to give necessary support while making needed repairs in holder tank at Los Angeles, by W. B. Cline, is worthy of careful examination, and shows the careful thought of a designer in handling a non-trussed roof holder. It reads as follows:

We found it necessary to put new connections in one of our holder pits. The holder is 60 feet diameter by 16 feet deep, with non-trussed roof. It had been in use for 17 years, part of the time for coal gas, and later as a relief holder for the generators. To facilitate the work we kept the holder suspended, by screws, some distance up from the bottom of the pit. The sketch shows how we trussed the crown of holder from the outside while emptying, cleaning out and putting new connections in the pit. The truss was blocked up on the rim of holder high enough to make the truss clear the crown of holder 6 inches. The guy rods, which were ⅝-inch round iron, with a turn-buckle in each, were fastened, one end to truss, the other end to the roller brackets on top of holder. This left the holder so that we could raise or lower it by the screws. The lower cord of the truss was made of three pieces of 2-inch by 10-inch Oregon pine bolted together, making it 6 inches by 10 inches. The upper cord and main braces were 6-inch by 8-inch pine. All other braces 6-inch by 4-inch. All truss bolts were ¾-inch round iron.

The center plate in holder crown is ¼-inch thick by 3 inches diameter. Through this we drilled 6 holes, 1 inch diameter. In these we hooked L-shaped bolts, allowing the ends to extend above the lower chord of the truss, making three bolts on each side of the truss.

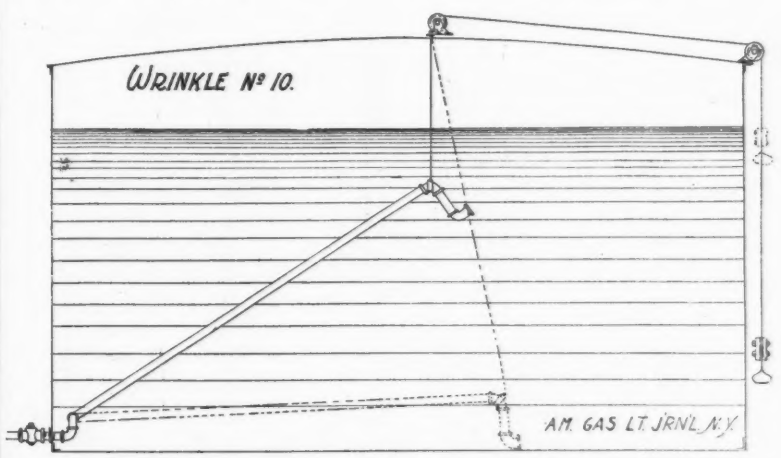
Over each pair of bolts we put an iron plate, as shown in sketch marked No. 1. L-bolt is shown in sketch No. 2.

After adjusting all guy-rods we screwed upon the six bolts in the center of crown, until we found that we had the weight of the top.

Wrinkle No. 8 (see cut, page 328.)—D. E. Knight sends a combination of Wrinkles, used for the purpose of introducing oil as an enricher to coal gas at Marysville. By referring to drawing an underground tank or receiver is represented; a measuring tank and pump above an Argand chimney, used as a sight-glass to regulate supply; a preventer or overflow pipe connects with the well to provide for stoppages. From the sight-glass the pipe runs to the retort, a relief gauge, to prevent too rapid a flow or vacuum caused by the atomizer injecting oil into the retort by fluctuating of steam pressure, the blower or atomizer spraying into a perforated pipe on top of a spent charge of coke. The retort lid is cast with a 2-inch hole, with boss surfaced to receive pipe flange, properly luted and held in position by iron clamp and screw bar. This completes the contrivance for enriching and gives entire satisfaction.

Wrinkle No. 9 is presented[1] in the form of a sample that possesses some features of novelty, claiming to be a governor, yet it has no moving parts. The detached leaden plug gives an idea of the principle used. There are two threads or passageways, a right and left. The streams of gas come in contact with each other when half around and are obliged to divide up again, going in opposite directions. The force of these two streams of gas coming together acts as a buffer holding down an excess of pressure. It is introduced for the principle made use of, as it adds to our knowledge of application. The fact that it acts at all is a constant surprise. Contributed by the inventor, whose name I do not know.

Wrinkle No. 10 (see cut, page 329).—It has been customary, when blending oils of different quality, to mix as intimately as possible with oars or paddles, agitating to prevent stratification and deliver a uniform quality of oil. A very efficient manner of effecting the desired end is

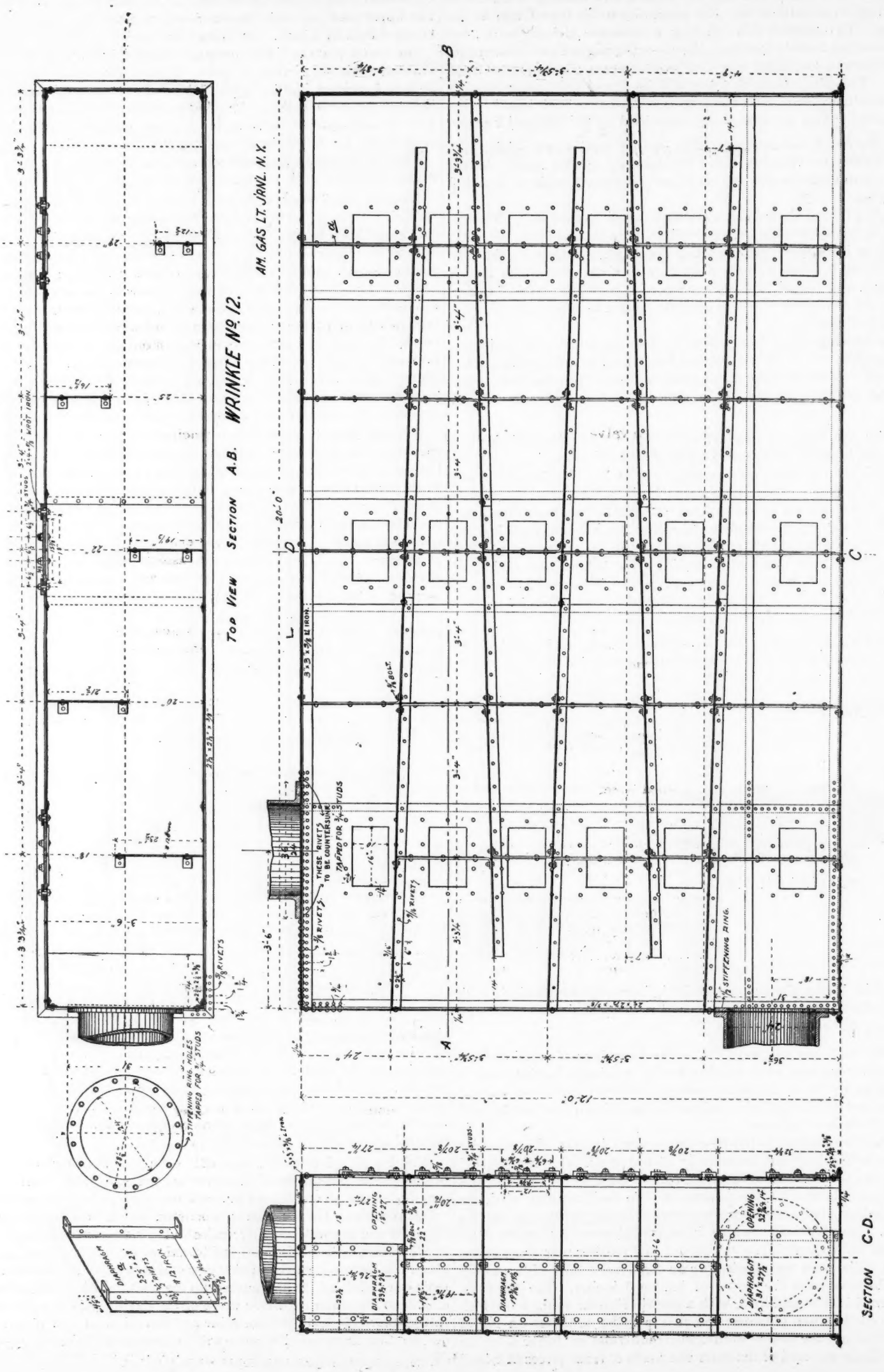


represented in Wrinkle No. 10. It consists simply of a number of elbows screwed on loose to form a swivel or universal joint, which allows the discharge pipe to be raised or lowered at will in the tank by means of wire rope and a couple of sheaves. By means of acounter weight the pipe can be kept in any position, lowered or raised without any trouble. This device can be applied to either suction or delivery pipe, could be kept moving up and down while pumping into or out of tank, thereby intimately blending or mixing the entire mass. This is contributed by our friend Richard Fenner.

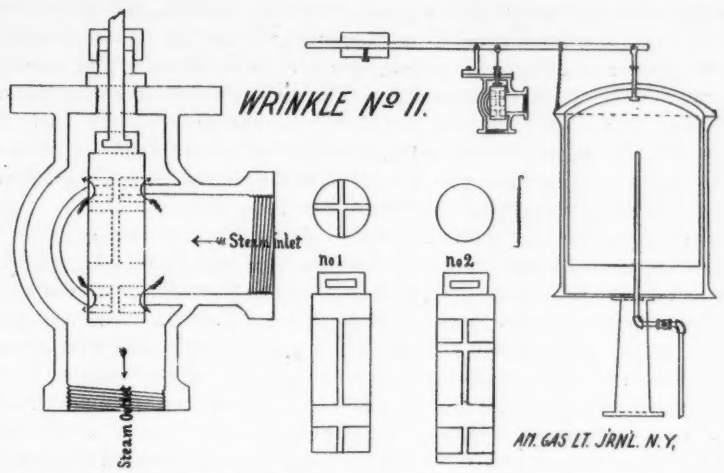
Wrinkle No. 11 (see cut, page 331).—An experience caused by the breaking of a belt suggested the following wrinkle, in the form of what may be termed an emergency or governor valve. It reads as follows:

One night our 16-inch rotary exhauster, which is driven by a belt from the engine, was laboring against a back pressure produced by a small station meter and small purifiers, when the belt broke and the engine raced before the man in charge could stop it. The pressure of gas from our relief holder had pushed up the float, which is connected by a lever to the steam regulator valve of the engine, and this let in the full pressure of steam to the engine and caused it to run away. We decided that there could be some way to prevent a like occurrence, and

1. No drawings accompanied this Wrinkle.—Eds. A. G. L. J.


TOP VIEW SECTION A.B. WRINKLE No. 12.
AM. GAS LT. JRNL. N.Y.
SECTION C-D.
THESE RIVETS TO BE COUNTERSUNK
TAPPED FOR ¾" STUDS
STIFFENING RING.
STIFFENING RING HOLES TAPPED FOR ¾" STUDS
DIAPHRAGM
OPENING
DIAPHRAGM

looking over the piston valve which regulates the flow of steam to the engine, we concluded that, by having a valve made as shown in sketch No. 1, the steam would be closed off from the engine when the regulating float was pushed up from any cause, such as a belt breaking, or



Steam Regulating Valve for Rotary Exhauster.

slipping from a pulley. The original piston valve is as shown in sketch No. 1. We have a piece of small chain, one end of which is fastened to the side of the float chamber; on the other end there is a hook. When we stop the exhauster we catch the hook on the lever which is connected to the float and valve, and this leaves the steam valve open and ready for starting. After the exhauster is started we remove the hook.—W. B. CLINE.

Wrinkle No. 12 (see cut, page 330) is a most complete addition to gas house appliances, and a generous contribution to the fund of information that the Wrinkle Department takes pleasure in disseminating. It is a new and novel hot tar scrubber. It reads:

An almost indispensable part of a modern coal gas works is some form of hot scrubber placed between the hydraulic main and the exhauster. This apparatus should be constructed as simply as possible, and it is necessary also that every part shall be easily accessible for the purpose of cleaning out accumulations of tar or pitch, and, at the same time, it must present as much surface in as small compass as possible, and provide that the gas shall come in contact with as much surface wetted by tar and ammoniacal liquor as possible, and yet provide free ways for the tar and ammoniacal liquor to flow through the machine.

To accomplish these results, I designed a scrubber for the North Beach Station, at San Francisco, of which a drawing is appended. This scrubber is, of necessity, of large dimensions, but is designed in good proportion, so that a scrubber of any size may be made by reducing the dimensions on the drawing. The scrubber is constructed of steel, and is 20 feet long, 12 feet high and 3 feet 6 inches wide. Extending across this shell, in the direction of its length, are 5 steel shelves, with an incline towards the bottom of 7 inches. The use of these shelves in a scrubber is not new, and this principle has been used for many years in scrubbing gas. To provide more surface for the gas, and also to break up any particles of tar mechanically suspended in the gas, five vertical partitions are arranged on each of these shelves in a zigzag form, so that the gas, instead of passing directly over each shelf, passes in a serpentine course around these partitions. The gas enters the scrubber at the bottom and passes in a zigzag direction around the ver tical partitions and over the shelves to the top, passing thence to the foul main and exhauster. The hot tar and ammoniacal liquor pass in at the top of the scrubber and flow down in a straight course over the shelves. The vertical partitions are arranged on legs, 1½ inches long, so that there is a clear space for the tar and liquor to run under them, thus preventing any building up and consequent stoppage in the corners between the vertical partitions and outer shell of the scrubber.

To facilitate cleaning, 18 manhole plates, 10 by 16 inches, are located at points opposite the vertical partitions. These are fastened on by ear pieces, as shown in the drawing, and are easily removed. By use of this tar scrubber I find the candle power of the gas is slightly increased. It has been often claimed that a tar scrubber will increase the candle power ½ candle. It liberates mechanically contained gas from the tar and liquor, and acts as a purifier for the partial removal of carbonic acid gas by the contact of the gas with hydraulic main liquor. It stops a great deal of tar which would otherwise pass through the exhauster, and is a great relief to the condenser and scrubber.—E. C. JONES.

Editor Parker—That completes the labors of your Department of Wrinkles, to gather from among you what we hope is both interesting and profitable, as it presents the practical part, the cream of the year's work in this line, which we most respectfully submit for your consideration, thanking those who have so kindly assisted to achieve the end we had in view.

(To be Continued.)

SPECIAL ENGLISH CORRESPONDENCE.

COMMUNICATED BY NORTON H. HUMPHRYS.

SALISBURY, ENGLAND, August 10th, 1896.

An Association of Water Works Engineers.—Present Position and Prospects of the Gas Industry.—Two Papers at the North British Association.

The British Association of Water Works Engineers has just held its first annual meeting at Nottingham, under the guidance of the first President, Mr. D. M. F. Gaskin, the Corporation Water Engineer, and the proceedings were in every way a success and full of hopeful promise for the future. This event is interesting to us because water works were at one time very intimately associated with gas works. When both branches of engineering were smaller and less important than at present, it was the usual thing to form "gas and water companies;" or where the Corporation exploited both enterprises, to place them under one management. But in our principal towns both have now acquired such magnitude as to become separate departments. In smaller places, however, there are many combined undertakings remaining, and several well known men in the gas profession are equally prominent in regard to water supply. So we shall watch the development of the Water Works Association with more than ordinary interest, feeling that it is a kind of relation to ourselves. Our friends have evidently been observing the progress of gas associations, and based their constitution on the experience so gained, as the custom of visiting the President on his native soil is by no means the only line on which they have followed our precedent. And it is to be hoped that they will be enabled to steer clear of the rocks, which have, so far as it is possible to judge, made hopeless wreck of the prospect of united action representing the whole of the gas interests of this country. The objects to be served by the Association, as set forth in the constitution, cover a wider area than that usually occupied by gas associations, and include such clauses as the following: "To assist the legislature, public bodies and others in ascertaining the views of persons interested or engaged in water works undertakings." "To originate and promote improvements in the law, and to support or oppose alterations therein in all matters relating to water works." "To appoint examiners and hold examinations." From these examples it will be seen that the new Association covers a wide field, in which there is ample room for work to be done, and it only remains for us to congratulate the President and all concerned on the excellent start that is already on record and to wish them every success in the future.

The accounts of the two large London Companies, for the half year ended June 30th, 1896, have been issued to the shareholders, and as usual they furnish some indication of the general state of the gas industry throughout the country. Notwithstanding the clear, dry weather that has prevailed during the last six months, which is by no means favorable to the sale either of gas or of coke, there is a small increase in the demand for gas, which is due to the extension of the prepayment meter system and to the use of gas for purposes other than lighting. That these advantages are not attainable without some outlay, however, is shown by the fact that the Gas Light and Coke Company have expended nearly £200,000 on fittings for hire, and that they are now issuing £150,000 additional capital for the purpose of meeting this expenditure. The automatic meter by itself is not of much value, and the excellent results obtained by its use can only be secured by letting fittings on hire—by fitting up cottage tenements ready for use, free of cost to the consumer. The credit of the increased business thus secured is as a rule entirely appropriated by the automatic meter, which is not quite fair, as a large proportion of the new consumption would be obtainable without the use of this appliance, by means of ordinary meters and a system of weekly collections. The consumption of gas is likely to be encouraged by the introduction of gas engines at popular prices, which is at last a thing accomplished. A few weeks since I bought an excellent little machine as a sample, the retail price of which is only £7. It is well and substantially made, efficient in working, and quite strong enough to run a small dynamo or any machine that is usually worked by hand. The cost of a 1-horse power size is only £23 to £25. So the great hindrance to the free and full use of gas as a motive power—the high initial price of the engine—is at last removed.

It is remarkable that although the incandescent light is guaranteed to save 30 to 50 per cent. of the gas consumed, and probably does so, in no case has its introduction injured the sales of gas. A smaller size of this make of burner, consuming 1¼ cubic feet of gas per hour and yielding a light of 35-candle power, is introduced for this season. The mild weather has had a very bad effect on the sales of coke in large towns, but in smaller districts, where the yards had been emptied in the previous season, this inconvenience was not so apparent. The Gas Light and Coke Company have dropped no less than £60,000 on coke alone, and the South Metropolitan have decreased £23,750 on residuals. Tar has fetched better prices, but the sulphate market is entirely demoralized and in the hands of the buyers. These disadvantages have been compensated for by the fact that coal has been cheaper to the extent of 1s. to 1s. 6d. per ton, and altogether the half year's working has been favorable. There is some talk of miners' strikes and other attempts to force the coal market being made when the demand sets in for the autumn, but they are not likely to meet with much success, and meanwhile contracts are being renewed at prices slightly under those of last year.

At the recent meeting of the North British Association of Gas Managers, held in Edinburgh, several communications possessing general interest were read. One of these was by Mr. H. O'Connor, of Edinburgh, who appears to have been giving close attention to the details of photometry, and has invented a very ingenious diagrammatic system whereby the elaborate calculations incidental to that operation may be dispensed with. Mr. W. Sugg and the late Mr. F. W. Hartley, with others, labored at this subject many years ago, and subsequently Mr. J. A. Coombs utilized the principles of logarithms for the preparation of a very simple and easy table, which was published in the *Journal of Gas Lighting*, and was sufficiently compact to be printed on a single card. For some unaccountable reason the merits of this system did not attract the attention of photometrists generally. The Coombs card is used regularly in my own laboratory, and is especially useful for checking the results of assistants or pupils, or for rapidly working out a series of tests. But Mr. O'Connor's diagrams are a decided step in advance. He also described a device arranged for attachment to an ordinary wet experimental meter, whereby the water level can be adjusted according to the tabular number representing pressure and temperature at the actual time, thus avoiding the necessity for correction under these heads. But this involves rather a nice question. Actual alteration of the volume of the gas is a different thing from burning it at a fixed volume, and then making corrections by calculation. Suppose the tabular number to be 960, Mr. O'Connor would use 5.2 cubic feet or thereabouts, instead of 5 cubic feet, which might bring about a different result to that obtained by actually burning the orthodox 5 cubic feet and correcting on paper. Which is the better or more accurate method is, of course, open to argument. Mr. O'Connor appears to have other important improvements in hand in connection with photometry, and anything he can do in the way of reducing either the time or the trouble necessary for taking reliable photometrical tests will be warmly welcomed.

Mr. William Young, of Peebles, contributed another of his interesting and valuable papers upon the physico-chemical properties of illuminating gases, which is a subject that he has especially followed for many years, not in an academic or pedantic way, but as a practical business man. This feature gives his communications a unique position, compared with the ordinary scientific lecturer, who simply points out interesting or remarkable facts, which may or may not be capable of practical application by some of his hearers, whereas Mr. Young takes the experiences of practical, everyday working and reasons back to the laws by which they are governed. The subject selected on the present occasion was the permanency of illuminating gas. Commencing with the laws that govern the separation of a substance in a liquid or solid state, from a gas in which it is retained or held in suspension, he showed that they are simple enough when only one substance is concerned, being simply functions of temperature, pressure and vapor tension, as in the well known example of rain, dew and mist, but went on to show that, in illuminating gases, the phenomena is much more complicated. In theory, assuming that a number of different vapors were present, each distinct from and unacted upon by the others, the phenomena would simply be a multiplication of that observed with a single substance. But the various components of coal gas do not act as simple diluents one of another. They are more like mutual solvents, with the result that the mixture has a vapor union of its own, which Mr. Young distinguishes as the "combined vapor tension," and which is a different thing from any arithmetical function based upon the vapor tensions of the various constituents.

We have here, by the way, a remarkable analogy to the heat-producing power of a gas, which is known to be different from the results furnished by calculating out the sum of the heating values of its various constituents. So long as this combined vapor tension is greater than the atmospheric pressure for the time being, at any temperature lower than that to which the gas is or will be exposed, the gas is what we call in practice a permanent gas, and will not throw down any deposit, notwithstanding the presence of certain substances that would be deposited if present by themselves. The mutual solvent action is an advantage as assisting in maintaining the permanence of the gas. But directly the balance is disturbed, as might be accomplished by cooling the gas to such an extent as would bring the combined vapor tension to less than the pressure of the atmosphere, the position of the mutual solvent action is changed. It somewhat resembles a weight taken off one part of the scale and put on the other. It will readily be seen that, once condensation is commenced, not only is the useful solvent action of the matter deposited lost to the general body of the gas, but the solvent action of the liquid comes into play, with the result that matters are dissolved out that would not otherwise have been deposited. Another important practical point dealt with in the paper was the effect of sudden cooling upon gases holding vapors in diffusion. Certain vapors would thus be reduced to the liquid state, but under some circumstances they would not be thrown down, but carried forward in a state of fog or mist, and might travel for a long distance. But a gas in which vapors were present in this vesicular condition is a different thing from one in which the vapors are properly different. The mist or fog is practically a liquid, and as such is not only readily condensed itself, but is also capable of exercising its solvent properties in the objectionable manner just referred to. This mist or fog may exist in such a slight degree as to give no trouble beyond occasional accumulations in meters or burners, or it may be so great as to cause frequent plugging of mains and services.

At a later period of the paper Mr. Young had something original to say about naphthaline. He pointed out that this substance is a sublimable crystalline solid, capable of passing directly from a state of gas to that of a solid, and that such crystalline solids lose, to a large extent, their solvent affinity for vapors and gases. Consequently coal gas may be passed in contact with pure crys alline naphthaline, without any appreciable loss of illuminating power. On account of this peculiarity it is possible that the general laws which govern the diffusion of hydrocarbons capable of existing in the liquid form do not apply to naphthaline, and that it is held in diffusion in a manner different to that obtaining with other hydrocarbons. These few extracts[1] do not by any means exhaust the valuable matter contained in the paper, but are simply specimens of the information given, and as such are sufficient to show that Mr. Young has added, in a substantial manner, one more to the list of valuable papers which he has from time to time given to the gas industry at large.

ITEMS OF INTEREST FROM VARIOUS LOCALITIES.

Mr. A. M. Sutherland, proprietor of the Herkimer (N. Y.) Gas Light Company, writes: "In order to keep up with the increasing demand for gas in Herkimer, we have just finished the following additions and improvements to the works: One new holder in steel tank—we also thoroughly overhauled the old holder, the tank of which was in a leaky condition; one additional little giant generator; and 1½ miles of new mains."

According to the Baltimore *News*: "If Mayor Hooper's plan proves successful, the present style of gas lamps will gradually disappear from the city's streets, and the lighting will be done at much less cost than heretofore. On the 22d inst. Superintendent of Lamps Swindell prepared specifications for the contract to supply Welsbach burners for Eutaw place. Similar lamps were put on the upper portion of Park avenue several months ago and the experiment was successful. Mayor Hooper said that not only had the lights given great satisfaction, but it was also shown that the gas used was much less than that consumed in the ordinary burners. Concluding his remarks on the subject the Mayor said: 'I hope to see this style of burner gradually introduced on other streets, whereby I believe a large saving can be effected.'"

It is proposed to establish a gas works in Ludington, Mich., and an ordinance for the governing thereof will soon be presented to the Ludington Council. Ludington is the capital of Mason county, Mich., and is situated on Lake Michigan, right at the mouth of the Marquette river. It is also the terminus in the Northwest of the Flint and Pere Marquette

1. For the full text of Mr. Young's paper, see Journal, Aug. 10, p. 208.

Railroad. It is 137 miles north by west of East Saginaw. It is noted for its exports of lumber and for its iron foundries. The population of Ludington is not far from 9,000.

EX-POSTMASTER U. M. OSBORN, of Rahway, N. J., has attained renewed notoriety by the inserting of an advertisement in the local papers, in which he invites stockholders of the Rahway Gas Light Company to unite with him in taking such action as will secure for them a detailed statement of the receipts and expenditures of the Company for the past five years. He further intimates that should this statement not prove satisfactory he will make application for the appointment of a receiver for the corporation.

"THE amalgamation of the San Francisco Gas Light Company and the Edison Electric Light and Power Company," says the San Francisco *Chronicle* of recent date, "is almost consummated. The proprietors of the Electric Company have already fixed a date for a meeting of the Directors to decide upon disorganizing, preparatory to going into the new corporation, and the Gas Company has also virtually named a time for a meeting with a like purpose in view. Few of the details of the deal are known. It is proposed to organize a new corporation, to be known as the San Francisco Gas and Electric Company, with a capital stock not exceeding $13,000,000, the total of the joint capitalization of the Companies as they now exist. It is probable that Mr. Joseph B. Crockett, the present President of the Gas Company, will hold a similar position in the new corporation. 'The deal will go through without any trouble, I think,' said Mr. Crockett some days ago, 'but such a matter as this, involving as it does the transfer of millions of dollars' worth of property, cannot be carried out without taking time to arrange the preliminaries. Each Company must be allowed to expert the others's books, and has done so. All these matters require time. People have been to me in the last few days asking why the transaction is not completed at once. To them and all others I must answer, give us a little time. We are protecting the interests of our stockholders in the gas corporation and must see that our property gets due representation in the new Company. There need be no fear on the part of the people that the combination of these Companies will tend to increase the cost of light. We believe under the present arrangement that both Companies can be operated more economically than at present, and if that is the case the people will get the benefit of it.'"

"OBSERVER" forwards the following: "There has lately been a great deal of complaint about the manner in which the Pawtucket (R. I.) station of the Consolidated Railroads has been lighted. The City Council passed a resolution calling the attention of the officers of the Road to this matter, and suggesting the necessity that a remedy be applied. There is no question but the station has been poorly lighted, for it looked more like a country depot than it did the stopping place of the Consolidated Road in such a large and thriving place as the city of Pawtucket. Some time ago the station was lighted by gas, but the Company must have thought it too expensive, for gas has not been used for a couple of years, and in its place were substituted several oil lamps which, while they are all right for some purposes and in some situations, are not just the thing for a place like the depot. The light was very poor both in the station and on the platforms, and the people visiting the city were often heard to remark about it, while some wondered there were not more accidents on account of the insufficiency of the illumination. However, the trouble will soon be remedied, for some days ago the official having charge of the matter signed a contract with the Pawtucket Gas Company to light the depot with gas. This will be satisfying news to all, and probably the agitation which the paper and the people have kept up had something to do with the change. Whether it did or not, the desired result has been accomplished and the depot will soon be lighted in good shape by gas."

THE proprietors of the Chelsea (Mass.) Gas Light Company have leased the premises No. 187 Winnisimmett street, and will fit the same up in handsome style for office purposes. The Company has occupied its present office location (No. 228 Broadway) since 1865.

THE Gas Consumers Association, of Milwaukee, has been incorporated, with a capital of $200,000, by Messrs. C. D. Brown, F. J. Meyer and H. L. Thomas. The Company is to run for 50 years, and the purpose, as set forth, is "to manufacture, purchase, use, sell, lease and rent gas regulators."

THE Capital City Gas Company, of Des Moines, Ia., is completing a coal storage plant at its East First street works. The Company has had much success this year in placing gas cookers and heaters, over 1,800 of which are now in the houses of consumers.

THE Atlanta (Ga.) *Journal* says that James H. Saunders has filed suit against the Atlanta Gas Light Company, through his attorneys, Messrs. Glenn & Rountree. He asks $1,000 damages for injuries sustained while in the employ of the Company. He alleges that he was hired to do ditching work, but that he was put at other duties than those stipulated in the contract, and that in going on with this work he sustained serious injuries. The latter came about through his having inhaled gas, which inhalation prostrated him so that he has not been able to earn a livelihood since.

THIS circular explains itself, and is to be charged to the proprietors of the Ottawa (Canada) Gas Company: "The Ottawa Gas Company has much pleasure in announcing to the public that all gas used for cooking and heating purposes will be reduced to the same price as Montreal, viz., $1 per 1,000 cubic feet. Also, that all cooking and heating ranges ordered before the 1st of September will be connected without charge for labor. The Company further announces that in order to meet the wishes of the working classes it will shortly be prepared to fit prepayment meters, so that they can purchase 25 cents' worth of gas for cooking whenever it is convenient for them to put a 25-cent piece in the slot of the meter. For this sum they will obtain about 250 cubic feet of gas."

JUDGE BELL, of Chatham, Canada, having heard the petition of the proprietors of the Chatham Gas Company for a revision of the amounts under which the Company was assessed for purposes of taxation, has decided that the assessment against income (put at $4,000) should be stricken out; but that the assessments on plant and street mains (together equaling $60,000) must stand.

THE old franchise of the Kalamazoo (Mich.) Natural Gas and Fuel Company, which was issued about 10 years ago, has been acquired by the proprietors of the recently organized Kalamazoo Light, Heat and Power Company.

MR. W. H. FRITCHMAN, who purchased the plant and franchises of the Fishkill and Matteawan (N. Y.) Gas Light Company at receiver's sale some month's ago, has disposed of the property to Mr. Howell C. Rees and associates. The new owners have organized the Phœnix Gas Company, of Fishkill and Matteawan, as the succeeding corporation, and it is understood that they will rebuild the generating plant, extend the main system and put the concern on as solid a footing as it can be placed.

THE Board of Equalization, of St. Paul, Minn., has carried its point in respect of the proposition recently mooted of taxing certain Companies—the St. Paul Gas Light Company, the St. Paul Edison Electric Light and Power Company, and the St. Paul Street Railway Company—on their franchises, in addition to the tax on real estate, etc. The method of arriving at the ratable value of the franchises for purpose of taxation was an entirely arbitrary one, and the figure assumed in the case of the Gas Company was $250,000. Putting all the divisions of the assessment together, the Gas Company is now asked to pay taxes on an assessment of $610,000. Manager Livingston, of the Company, in arguing before the Board against the proposition to rate and assess the franchise, said he would not give $250,000 for the franchise if it had 100 years of life, instead of 9 or 10—we believe the grant lapses in 1905. Further, he declared that the assessment of a franchise was illegal, unfair and unprecedented.

AT the ordinary half-yearly general meeting of the Gas Light and Coke Company, of London, England, which had to do with the operations of the Company for the six months ended June 30th, the Governor (Col. W. P. Makins) had this to say about prepayment meters: "There has been an increase in the half year's expenditure, as compared with June, 1895, of between $40,000 and $45,000, or of $145,000 as compared with the June half of 1894. The whole of this additional charge had been incurred in connection with the further and continued extension of the automatic meter supplies. As he had on former occasions explained, the introduction of this system was necessarily costly, and it had made very serious demands both upon their revenue and their capital accounts. But up to the present time it had proved remunerative. In connection with this he might mention that the average consumption per meter remained, as he informed the proprietors six months ago, at about 20,000 cubic feet per annum; and he was therefore glad to be able to report that there had been a regular addition to these supplies, week by week. The total number up to June last was

just over 42,000, as against 11,000 on June 30, 1895; and there were on hand on the 1st ult. about 6,500 applications, which they hoped to be able to comply with before the end of the current month. In the spring of this year, owing to the impossibility of obtaining meters in sufficient numbers to enable the Company to complete with anything like promptitude all the supplies on order, they were obliged to suspend receiving additional applications. The fact was that they had been getting into very serious disgrace with the large number of applicants who had entered into contracts for automatic meter supplies which the Company had been unable to complete. The arrangements they had made for the future would, he hoped, prevent any similar disappointment; and he had no doubt that the number of consumers under this system would again be very largely increased before the end of the current year. There had been in this, as in all other new systems, many difficulties to overcome. In the first place, the mechanism of the penny-in-the-slot attachment in some cases had worked very unsatisfactorily, causing both consumers and the Company's officers considerable trouble and annoyance. Again, the money box had been found to be too great a temptation to members of the 'area sneak' fraternity; while in some cases the Directors had had to take proceedings against consumers for wanton damages to the meters and fittings. However, the police had dealt efficiently with the former class, and the magistrates equally so with both classes. All this had entailed considerable expense in connection with the system, and accounted for some of the additional expenditure under the heads of both distribution and law charges. He wished to say to the consumers generally that, if this system of gas supply was to be a success, and was to be maintained and expanded, they must look to them to co-operate with the Company in preventing any abuse of it and injury to the meters in their charge."

THERE are 4,984 public gas lamps in use in Baltimore for street lighting purposes. Last year the quantity of gas consumed on street lighting account amounted to 97,526,400 cubic feet in the city proper, and to 12,072,600 cubic feet in the "annexed districts."

THE new owners of the gas plant at Salina, Kas, have determined to rebuild within a year or so; the new construction is to be of the coal gas type.

Manufacturers Educating Their Employees.

An editorial writer in the *Iron Age* remarks that the free silver advocates are very much disturbed over the reported attitude of manufacturers toward the silver cause. These sensitive souls shudder when they think of the manner in which workmen in the factories are to be intimidated into voting as their employers think! If a manufacturer ventures to express the opinion that the triumph of silver in November will close his factory he is accused of uttering a threat to intimidate such voters as he employs into voting to support the policy that he favors. Within the past week a number of hysterical articles have appeared on this subject in the columns of free silver papers. They look upon the mere utterances of manufacturers as actual attempts at bulldozing, and talk of passion and prejudice and intolerance as though these are the besetting sins of manufacturers who believe in maintaining the existing standard.

We believe that if a thorough investigation could be made it would be found that manufacturers are, as a class, singularly free from the disposition to politically oppress those whom they employ. Exceptions may be found, but they are not known to us. Manufacturers have too many other troubles to overcome to risk the development of serious misunderstandings with their workmen by interfering with political tendencies or prejudices. A movement which is now under way in the West will probably cause still more hysteria when it becomes generally known. Some managers of large factories, who are apprehensive of the serious disturbance of all business if free coinage is successful, and who believe that education and discussion will cause voters to side with them, have arranged for weekly meetings in their factory yards to be addressed by men who have made the monetary question a study, but who speak from a perfectly non-partisan standpoint. The meetings are conducted during the employers' time, so that the employees lose no earnings while participating in the meetings. Some of them have proved very interesting, questions being asked of the speakers that showed how profoundly the workmen are thinking on this subject. Probably the very fact that such meetings are being held within factory fences may be seized upon as evidence that employers are "intimidating" their men, but no rational creature would apply such a term to proceedings of this character if he were to any extent familiar with the class of men who work in factories. No men are more jealous of their rights and privileges or quicker to resent undue attempts to influence their political views.

Never before has a question which has been made a political issue so stirred up all classes. It is discussed with increasing interest as the week passes by, and every business man is impelled to do what he can to secure the majority of voters on his side of the question. Under such circumstances it would be remarkable indeed if a manufacturer did not dare to express his opinions or venture a prediction as to what the outcome might be in case of the success of either side. On the other hand, it will more likely happen that every factory will be the seat of an educational movement, designed to instruct every workman as to what he may expect if free coinage wins, so that he will not go to the polls in blind faith in what he may have picked up on the other side.

The Problem of Economical Heat, Light and Power Supply for Business Blocks, School Houses, Dwellings, etc.

Mr. G. A. Gerdtzen, of the Class of '96, Mining Section of the University of Wisconsin, in a thesis presented for the degree of M. E., considers the subject named in the heading. Prof. Storm Bull, in reviewing the thesis, in the June issue of the *Wisconsin Engineer*, says:

This paper which has just been published as No. 8 in the Engineering Series of the Bulletins of the University of Wisconsin is a very valuable addition to the literature on the subject announced in the title. The author considers the possible solutions of the problem: the electrical, the gas, and the steam solution; he compares them under all possible circumstances as they may occur in practical life, and then draws his conclusions in favor of the use of gas, formed by a mixture of that produced by the retort and water-gas processes. This conclusion seems to the writer perfectly justified, as it is based upon the most reliable data and experiments to be found in technical literature, the author having thoroughly studied his subject both in technical journals and the best books in this line.

The electrical solution is first disposed of, it being easily shown that for the combined problem of heat, light and power supply, electricity can not yet compete with either steam or gas, the efficiency of the process of heating by electricity being so very low.

It would seem at a first glance that steam should be the most economical, and in certain individual cases this is no doubt true, for instance for large steel frame buildings where there can be no flues in the walls and where a private installation would be advantageous. The principal reason why the economy of the steam method is lower than that of the gas, is that the load factor is very low and the stand-by loss great, because of the impossibility of storing the steam, and because the demand will be very variable.

A gas plant, on the other hand, especially one in which the retort and water gas processes are combined, will have a low standby loss, and because of the easy storing of the gas it may be run at its full capacity or not at all, as the demand on gas requires it, and still very nearly retain the maximum running efficiency. This difference in economy is very clearly shown in the paper; but it should be noted that it only applies to comparatively small plants, where, for instance, the size of the engine furnishing power is less than 50-horse power. It should also be borne in mind that it is only in the combined problem of furnishing heat, light and power that the gas solution is the most economical one. It must, however, also be admitted that the use of gas simplifies the distribution of heat and light to the various rooms of a building as compared with steam; but this side of the question cannot be taken into account in a paper where the economy of the plant is to be the deciding question. One cannot help coming to the conclusion, after reading this paper, that the heating of dwellings by means of gas ought to be very much more popular than it is at present. If a gas stove can utilize 80 per cent. of the heat produced by the complete combustion of the gas, it certainly will be a comparatively cheap method of heating dwellings in large cities where the cost of gas is low.

The author states in concluding his paper that a conservative engineer will ever be loath to leave an old system for a new one which has not been tried, but that the necessity of progress because of competition will force him to try a new system for furnishing heat, light and power to buildings, and it will then be found that the system proposed by the author is supported by sound and reliable conclusions from engineering facts of to-day. The writer of this review expresses the hope that the system may soon be tried, and he has no doubt that Mr. Gerdtzen's conclusions will be verified.

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A Simple Wiring Rule.

Mr. E. P. Roberts, in *Electrical World*, proposes the following:

The rule is that for a drop of 10 volts the ampere-feet is equal to the number of circ. mils cross-section of the wire. For other drops this varies as the ratio of such drop to 10.

Example 1.—300 lamps each of 110 volts and one-half an ampere are to be supplied at a distance of 500 feet with a drop of 10 volts. Required, the size of wire. The ampere-feet is equal to $150 \times 2 \times 500 = 150,000$. Therefore, the size wire is 150,000 circ. mils, the nearest size B. & S. gauge being No. 000.

Example 2.—60,000 feet from a power house it is desired to supply 200 amperes at a drop of 100 volts. The trolley wire is No. 00. Required, the size of feeder. Ampere-feet is equal to $60,000 \times 200 = 12,000,000$ circ. mils for a 10-volt drop. For a 100-volt drop the size would be 1,200,000 circ. mils. Deducting the size of the trolley wire which is No. 00 or 125,000 circ. mils, gives 1,075,000 circ. mils, equivalent practically to two 500 circ. mils feeders.

Example 3.—A trolley line is provided with two No. 000 wires. It is desired to know how far they will carry 200 amperes with a drop not exceeding 80 volts. Two No. 000 wires have an area of approximately 320,000 circ. mils, which, divided by 200 amperes, gives 1,600 feet for a 10-volt drop. As the drop is, however, 80 volts, multiply by eight and obtain 12,800 feet as the resistance.

Wires of size larger than No. 0000 are generally stated in circ. mils. For the benefit of those who are not familiar with the empirical formula of the B. & S. gauge, attention is called to the fact that it is one of geometrical progression; that is, it doubles in cross section for every three numbers increase in size, and each size has a cross section .8 of that of the next larger, and that No. 10 B. & S. is about 10,000 circ. mils. No. 5 B. & S. weighs 100 pounds per 1,000 feet. The formula would be accurate if the resistance of a mil-foot of commercial copper was 10 ohms at ordinary temperatures, and for standard makes of copper wire the formula is correct within 5 per cent. In other words, it is more accurate than the data on which the calculations are based. Greater accuracy is unnecessary.

Locating Pipe Obstructions.

Engineering Record reports that an exchange, speaking of the pneumatic tube service in London, Paris and Berlin, thus describes an ingenious method of determining the position of inaccessible obstructions, which looks as if it might be modified so as to be serviceable for other kinds of pipes: "When a pipe is obstructed a diaphragm is attached to the end of it and a pistol shot is fired into the tube through an opening just below where the diaphragm is placed. The sound acting on the diaphragm closes an electric circuit and makes a mark on a chronograph. The sound wave traveling through the tube meets the obstruction and is reflected, and upon its return makes another mark on the chronograph. The interval of time indicated by the chronograph gives a ready means of determining the distance of the obstruction from the end."

The Market for Gas Securities.

The unsettled and depressed conditions which have ruled the general share market for the past two months or more still continue, and quotations are in no sense an indication of the real value of the properties which the priced shares represent. To day (Friday) Consolidated gas at the opening was quoted at 138 to 139, ex-dividend of 2 per cent., payable September 15. There has been comparatively little trading in Consolidated, and the stock that has really changed ownership has been taken up by the people who have been absorbing it right along. Equitable is bid for at the price named a week ago, and Mutual is nominally lower by some points than the figure recorded last Friday. Standard, both as to common and preferred, holds fairly well, although bidders for the preferred are offering only 99. New York and East River, in which there was some trading during the week, is weaker at 25 bid. We doubt, however, if any round amount of the stock could be secured under 27½. Brooklyn Union, both as to stock and bonds, is unchanged. It certainly looks that these securities are cheap.

Bay State is neglected and weak, holders asking 17 for the common. The bonds are also sluggish. Chicago gas shows symptoms of returning strength, and we fail to see how other than profit in the near future could result from a purchase of the shares at anything under 53. Consolidated, of Baltimore, hardened a trifle in the week; 57½ is freely bid for it. The business of the Company is steadily increasing. Cincinnati gas is lower, at 194 bid, and continued weakness is the prevailing characteristic of the Laclede issues.

San Francisco gas seems to have found its normal level, at 85 to 87. The preliminaries for the consolidation of the Company with the local Edison concern have to all practical intent been arranged. Pacific Gas Improvement Company, of San Francisco, is steadily held at 80 to 82, and the other Pacific Coast gas securities more than hold their own. Consumers gas, of Jersey City, still keeps on the down grade, some stock therein having been offered recently at the extremely low figure of 76. Western, of Milwaukee, is reported at 50 to 51, and it certainly is a purchase.

Gas Stocks.

Quotations by Cochran & Close, Brokers and Dealers in Gas Stocks.

35 WALL ST., NEW YORK CITY.

AUGUST 31.

☞ All communications will receive particular attention.
☞ The following quotations are based on the par value of $100 per share.

N. Y. City Companies.	*Capital.*	*Par.*	*Bid.*	*Asked.*
Consolidated	$35,430,000	100	138	139
Central	500,000	50	150	..
" Scrip	220,000	..	100	.
Equitable	4,000,000	100	185	..
Bonds, 6's	1,000,000	1,000	105	..
" 1st Con. 5's	2,300,000	1,000	114	.
Metropolitan Bonds	658,000	..	108	112
Mutual	3,500,000	100	205	215
" Bonds	1,500,000	1,000	100	102
Municipal Bonds	750,000	.	..	.
Northern	150,000	50	79	80½
" Bonds	150,000	1,000	..	98
New York and East River	5,000,000	100	25	28
Preferred	2,000,000	100	55	65
Bonds 1st 5's	3,500,000	1,000	94	97
" 1st Con. 5's	1,500,000	.	82	86
Richmond Co., S. I.	348,650	50	50	..
" Bonds	100,000	1,000	..	..
Standard	5,000,000	100	71	74
Preferred	5,000,000	100	98	101
Bonds, 1st Mortgage, 5's	1,500,000	1,000	107	111
Yonkers	299,650	50	130	
Out-of-Town Companies.				
Brooklyn Union	15,000,000	100	80	84
" " Bonds (5's)	15,000,000	1,000	100	101
Bay State	5,000,000	50	16	17
" Income Bonds	2,000,000	1,000	30	32
Boston United Gas Co.—				
1st Series S. F. Trust	7,000,000	1,000	75	80
2d " " "	3,000,000	1,000	60	62
Buffalo Mutual	750,000	100	125	..
" Bonds	200,000	1,000	95	100
Central, San Francisco	2,000,000	..	95	..
Chicago Gas Co.	25,000,000	100	51⅛	51¾
Chicago Gas Lt. & Coke Co.				
Guaranteed Gold Bonds.	7,650,000	1,000	94	94¼
Columbus	1,069,000	..	..	65
1st Mortgage	1,085,000	..	..	96
Consumers, Jersey City	2,000,000	100	..	76
" Bonds	600,000	1,000	95	.
Cincinnati G. & C. Co.	7,000,000	100	194	..
Consumers, Toronto	1,600,000	50	184½	187
Capital, Sacramento	500,000	50	..	41
Bonds (6's)	150,000	1,000	.	..
Consolidated, Baltimore	1,000,000	100	57⅛	58½
Mortgage, 6's	3,600,000	..	107	107½
Chesapeake, 1st 6's	1,000,000	..	..	..
Equitable, 1st 6's	910,000	..	..	..
Consolidated, 1st 5's	1,490,000	..	..	..
Detroit	4,000,000	..	32	33
" Con. Bonds	4,312,000	..	..	82
Equitable Gas & Fuel Co.,				
Chicago, Bonds	2,000,000	1,000	..	101
Fort Wayne	2,000,000	..	78	81
" Bonds	2,000,000	..	83	86
Hartford	750,000	25	..	145
Indianapolis	2,000,000	..	..	125
" Bonds, 6's	2,650,000	..	97	101
Jersey City	750,000	20	180	..
Lafayette Gas Co., Ind	1,000,000	100	..	91
Bonds	1,000,000	1,000	..	86
Louisville	2,570,000	50	..	..
Laclede, St. Louis	7,500,000	100	17⅛	18⅛
Preferred	2,500,000	100	.	80
Bonds	9,034,400	1,000	..	87½
Little Falls, N. Y.	50,000	100	..	100
Bonds	25,000	..	..	100
Montreal, Canada	2,000,000	100	200	.
Newark, N. J., Gas Co.	1,000,000	..	93	98
Bonds, 6's	4,000,000	..	123	..
New Haven	1,000,000	25	225	..
Oakland, Cal.	2,000,000	..	52	53¼
" Bonds	750,000	..	..	..
Peoples Gas Lt. & Coke Co.,				
Chicago, 1st Mortgage	2,100,000	1,000	..	108
2d "	2,500,000	1,000	104	105
Peoples, Jersey City	500,000	50	..	175
Paterson, N. J.	.....	25	99	102
Rochester Gas & Elec. Co.	2,150,000	50	..	..
Preferred	2,150,000	50	83	..
Consolidated 5's	2,000,000	..	87½	90
San Francisco, Cal.	10,000,000	100	86½	87
St. Paul Gas Light Co.	1,500,000	100	67½	70
1st Mortgage, 6's	650,000	..	84	87
Extension, 6's	600,000	..	..	..
General Mortgage, 5's	2,400,000	.	88	90
Syracuse, N. Y.	500,000	25	..	..
Washington, D. C.	2,000,000	20	250	..
Western, Milwaukee	4,000,000	100	50	51
Bonds, 5's	3,556,000	.	80	84
Wilmington, Del.	500,000	50	180	182

Advertisers' Index.

GAS ENGINEERS.

Page

Jos. R. Thomas, New York City ... 357
Wm. Henry White, New York City ... 355
Fred. Bredel, Milwaukee, Wis. ... 340
Geo. R. Rowland, New York City ... 355
The Western Gas Construction Co., Fort Wayne, Ind. ... 346
Humphreys & Glasgow, New York City ... 342
T. G. Lansden, St. Louis, Mo. ... 355
American Gas Co., Phila., Pa. ... 340
David Leavitt Hough, New York City ... 357

PROCESSES.

Bartlett, Hayward & Co., Baltimore, Md ... 353
United Gas Improvement Co., Phila., Pa ... 345
Burdett Loomis, Hartford, Conn ... 344
National Gas and Water Co., Chicago, Ills. ... 347
Economical Gas Apparatus Construct'n Co., Toronto, Ont. 353
The Western Gas Construction Co., Fort Wayne, Ind. ... 346

GAS WORKS APPARATUS AND CONSTRUCTION.

James R. Floyd & Sons, New York City ... 356
Continental Iron Works, Brooklyn, N. Y ... 354
Deily & Fowler, Phila., Pa ... 356
Kerr Murray Mfg. Co., Fort Wayne, Ind ... 352
Stacey Mfg. Co., Cincinnati, Ohio ... 355
Bartlett, Hayward & Co., Baltimore, Md ... 353
Davis and Farnum Mfg. Co., Waltham, Mass. ... 352
R. D. Wood & Co., Phila., Pa ... 354
Isbell-Porter Company, New York City ... 354
Fred. Bredel, Milwaukee, Wis ... 340
United Gas Improvement Co., Phila., Pa ... 345
Berlin Iron Bridge Co., East Berlin, Conn ... 342
National Gas and Water Co., Chicago, Ills ... 347
Economical Gas Apparatus Construct'n Co., Toronto, Ont. 353
The Western Gas Construction Co., Fort Wayne, Ind. ... 346
Humphreys & Glasgow, New York City ... 342
Gas Engineering Co., Pittsburgh, Pa ... 352
American Gas Co., Phila., Pa. ... 340

SCRUBBERS AND CONDENSERS.

G. Shepard Page's Sons, New York City ... 355
R. D. Wood & Co., Phila., Pa ... 354
James R. Floyd & Sons, New York City ... 356
Continental Iron Works, Brooklyn, N. Y ... 354
Gas Engineering Co., Pittsburgh, Pa ... 352

REGENERATIVE FURNACES.

Bartlett, Hayward & Co., Baltimore, Md ... 353
Fred. Bredel, Milwaukee, Wis ... 340
J. H. Gautier & Co., Jersey City, N. J ... 350
Parker-Russell Mining and Mfg. Co., St. Louis, Mo ... 350
Adam Weber, New York City ... 350

TAR AND CARBONIC ACID EXTRACTOR.

G. Shepard Page's Sons, New York City ... 355

AMMONIA CONCENTRATORS.

Michigan Ammonia Works, Detroit, Mich ... 337
G. Shepard Page's Sons, New York City ... 355
Gas Engineering Co., Pittsburgh, Pa ... 352

GAS METERS.

John J. Griffin & Co., Phila., Pa ... 320
American Meter Co., New York and Philadelphia ... 359
The Goodwin Meter Co., Phila., Pa ... 358
Helme & McIlhenny, Phila., Pa. ... 359
D. McDonald & Co., Albany, N.Y ... 359
Nathaniel Tufts, Boston, Mass ... 358
Maryland Meter and Mfg. Co. Baltimore, Md ... 358
Metric Metal Co., Erie, Pa ... 358
Keystone Meter Co., Royersford, Pa ... 338
Buhl Stamping Company, Detroit, Mich ... 359

PREPAYMENT METERS.

American Meter Co.. New York and Philadelphia ... 359
John J. Griffin & Co., Phila., Pa ... 320
D. McDonald & Co., Albany, N. Y ... 359
Helme & McIlhenny, Phila., Pa ... 359

GAS AND WATER PIPES.

Ohio Pipe Co., Columbus, Ohio ... 357
M. J. Drummond, New York City ... 357
R. D. Wood & Co., Phila., Pa ... 354
Warren Foundry and Machine Co., New York City ... 357
Donaldson Iron Co., Emaus, Pa ... 357
Addyston Pipe and Steel Co., Cincinnati, O ... 357

PIPE CUTTERS.

Wm. Anderson, East Boston, Mass ... 337

STEAM BLOWER FOR BURNING BREEZE.

H. E. Parson, New York City ... 347

GAS COALS.

Penn Gas Coal Co., Phila., Pa ... 349
Perkins & Co., New York City ... 348
Despard Gas Coal Co., Baltimore, Md ... 349
Westmoreland Coal Co., Phila., Pa ... 349
Berwind-White Coal Mining Co., New York and Phila ... 348

CANNEL COALS.

Perkins & Co., New York City ... 348
Macfarlane & Co., Louisville, Ky ... 337

GAS ENRICHERS.

Standard Oil Co., New York City ... 349
The Sun Oil Co., Pittsburgh, Pa ... 349

COKE CRUSHER.

C. M. Keller, Columbus, Ind ... 349

CONVEYING MACHINERY.

C. W. Hunt Company, N. Y. City ... 338

GAS GAUGES.

The Bristol Co., Waterbury, Conn ... 337

GAS GOVERNORS.

Connelly Iron Sponge and Governor Co., New York City. 347
Isbell-Porter Co., New York City ... 354
The Wilder Mfg. Co. Phila., Pa ... 333

SELF-SEALING MOUTHPIECE DOORS.

Isbell-Porter Company, New York City ... 354
Continental Iron Works, Brooklyn, N. Y ... 354
G. Shepard Page's Sons, New York City ... 355

RETORTS AND FIREBRICK.

J. H. Gautier & Co., Jersey City, N. J ... 350
B. Kreischer & Sons, New York City ... 350
Adam Weber, New York City ... 350
Laclede Firebrick Mfg. Co., St. Louis, Mo ... 350
Cyrus Borgner, Phila., Pa ... 350
James Gardner, Jr., Pittsburgh, Pa ... 350
Henry Maurer & Son, New York City ... 350
Baltimore Retort and Firebrick Co., Baltimore, Md ... 350
Parker-Russell Mining and Mfg. Co., St. Louis, Mo ... 350
Brooklyn Firebrick Works, Brooklyn, N. Y ... 350

CEMENTS.

C. L. Gerould & Co., Mount Vernon, N. Y ... 350

INCANDESCENT GAS LAMPS.

Welsbach Commercial Co., Phila., Pa ... 330

MICA GOODS.

The Mica Mfg. Co., New York City ... 337

BURNERS.

C. A. Gefrorer, Phila., Pa ... 354

LAVA GAS TIPS.

D. M. Steward Mfg. Co., Chattanooga, Tenn ... 337

GAS TUBING.

Wm. M. Crane & Co., New York City ... 341

PURIFYING MATERIALS.

Connelly Iron Sponge and Governor Co., New York City 347
Greenpoint Chemical Works, Brooklyn, N. Y ... 347
Henry W. Douglas, Ann Arbor, Mich ... 347

EXHAUSTERS.

The P. H. & F. M. Roots Co., Connersville, Ind ... 344
Isbell-Porter Company, New York City ... 354
Connelly Iron Sponge and Governor Co., New York City 347

VALVES.

Ludlow Valve Manufacturing Co., Troy, N.Y ... 346
Chapman Valve Manufacturing Co., Boston, Mass ... 346
R. D. Wood & Co., Phila., Pa ... 354
Continental Iron Works, Brooklyn, N. Y ... 354
The P. H. & F. M. Roots Co., Connersville, Ind ... 344
Isbell-Porter Co., New York City ... 354
The Western Gas Construction Co., Fort Wayne, Ind ... 346

ELECTRICAL APPARATUS.

Wm. Henry White, New York City ... 355

GAS ENGINES.

Otto Gas Engine Works, Phila., Pa ... 360
The American Gas Engine Co., Phila., Pa ... 351
Backus Water Motor Co., Newark, N. J ... 337

ENGINES AND BOILERS.

The Hazelton Boiler Company, New York City ... 337
W. G. & G. Greenfield, East Newark, N. J ... 337

PURIFIER SCREENS.

John Cabot, New York City ... 337

GAS STOVES.

American Meter Co., New York and Philadelphia ... 343
The Goodwin Meter Co., Phila., Pa ... 338
George M. Clark & Co., Chicago, Ills ... 341
Maryland Meter and Manufacturing Co., Baltimore, Md. 358
William M. Crane & Co., New York City ... 341
Keystone Meter Co., Royersford, Pa ... 338
A. Weiskittel & Son, Baltimore, Md ... 61

CHINA GAS KILNS.

William M. Crane & Co., New York City ... 341

GASHOLDER PAINT.

New York Marine Paint Co., Poughkeepsie, N.Y ... 346

GASHOLDER TANKS.

J. P. Whittier, Brooklyn, N. Y ... 346

GASHOLDERS.

Bartlett, Hayward & Co., Baltimore, Md ... 353
Continental Iron Works, Brooklyn, N. Y ... 354
Deily & Fowler, Philadelphia, Pa ... 356
Davis & Farnum Mfg. Co., Waltham, Mass ... 352
Kerr Murray Mfg. Co., Fort Wayne, Ind ... 352
Stacey Mfg. Co., Cincinnati, Ohio ... 355
R. D. Wood & Co., Philadelphia, Pa ... 354

BOOKS, ETC.

Scientific Books ... 356
Field's Analysis ... 348
Digest of Gas Cases ... 349
Directory of Gas Companies ... 357
Practical Photometry ... 320
Coal Tar Genealogical Tree ... 348
Management of Small Gas Works ... 242
Handbook on Gas Engines ... 357
Gas Flow Computers ... 338
Hughes' "Gas Works" ... 337

DIVIDEND NOTICE.

OFFICE OF WELSBACH COMMERCIAL COMPANY,
40 WALL ST., NEW YORK CITY, Aug. 13, 1896.

The Directors have this day declared a quarterly dividend of two (2) per cent. on the preferred stock, payable on Sept. 10, 1896, to stockholders of record at the close of business Aug. 29. The Transfer books of the preferred stock will be closed from Aug. 31 to Sept. 10, both inclusive. Checks will be mailed.

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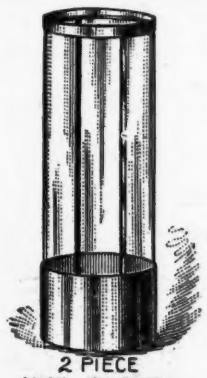

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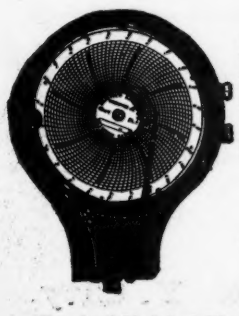

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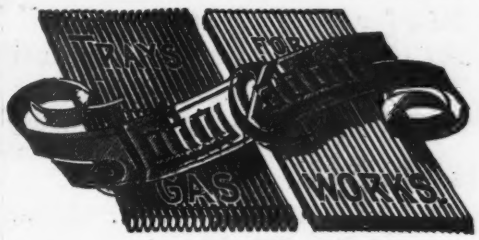

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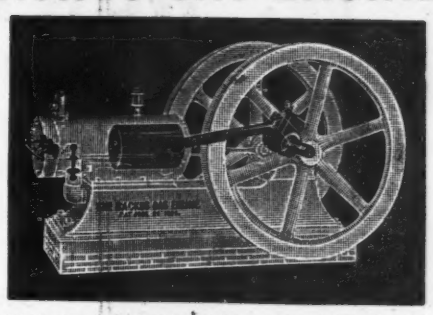

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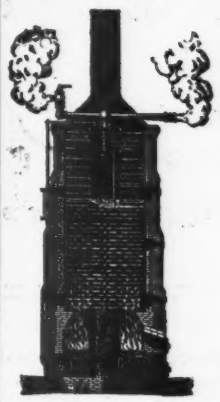

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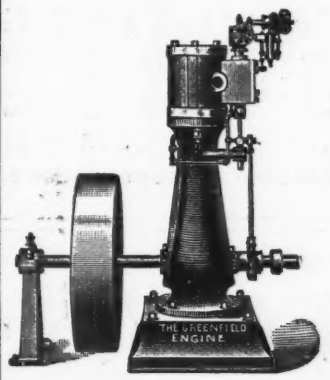

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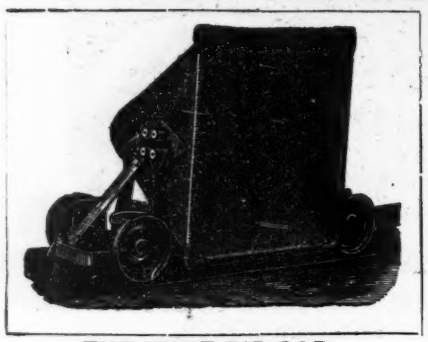

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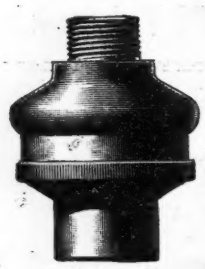

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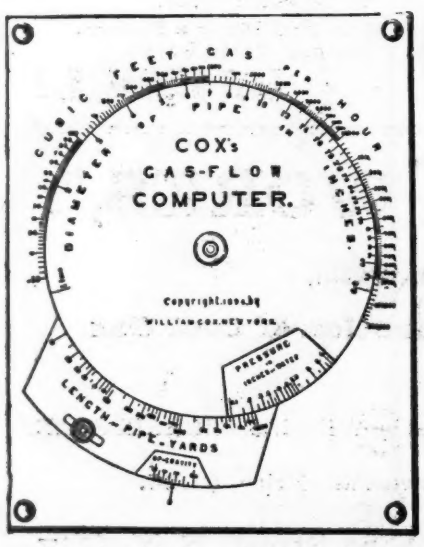

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CAUTION!!

Persons dealing in counterfeit lights are liable to criminal prosecution, and a large number of indictments have already been found against such dealers.

All infringements of this Company's patents will be promptly and vigorously prosecuted, dealers and users being equally liable. This Company will prosecute all parties in whose possession infringing lights are found.

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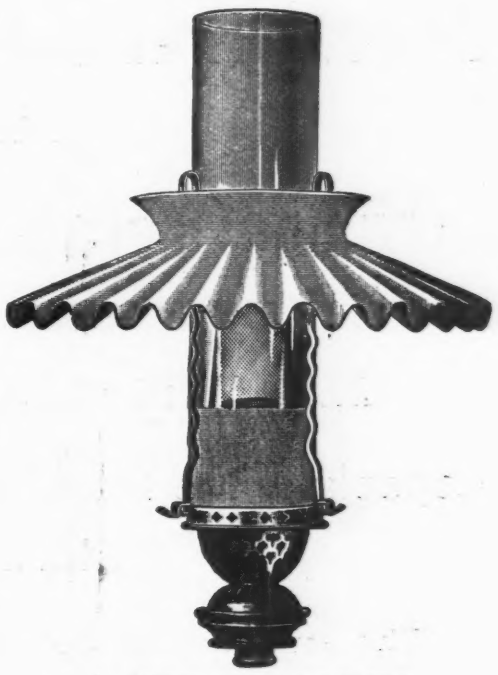
For your own protection, see that you get the genuine Welsbach light, as both the counterfeit and the infringing lights are greatly inferior.



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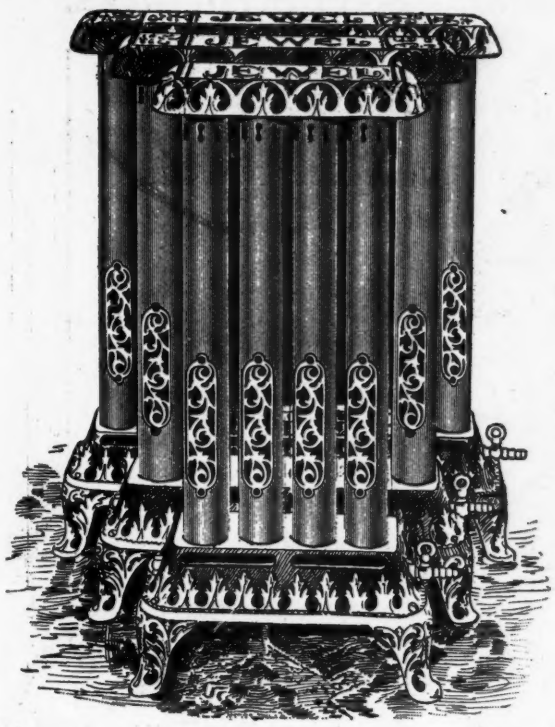

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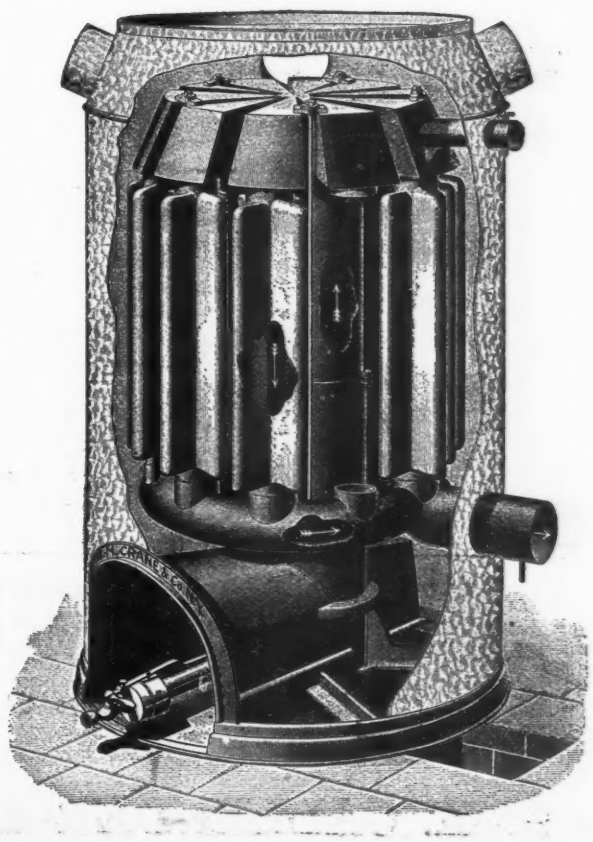

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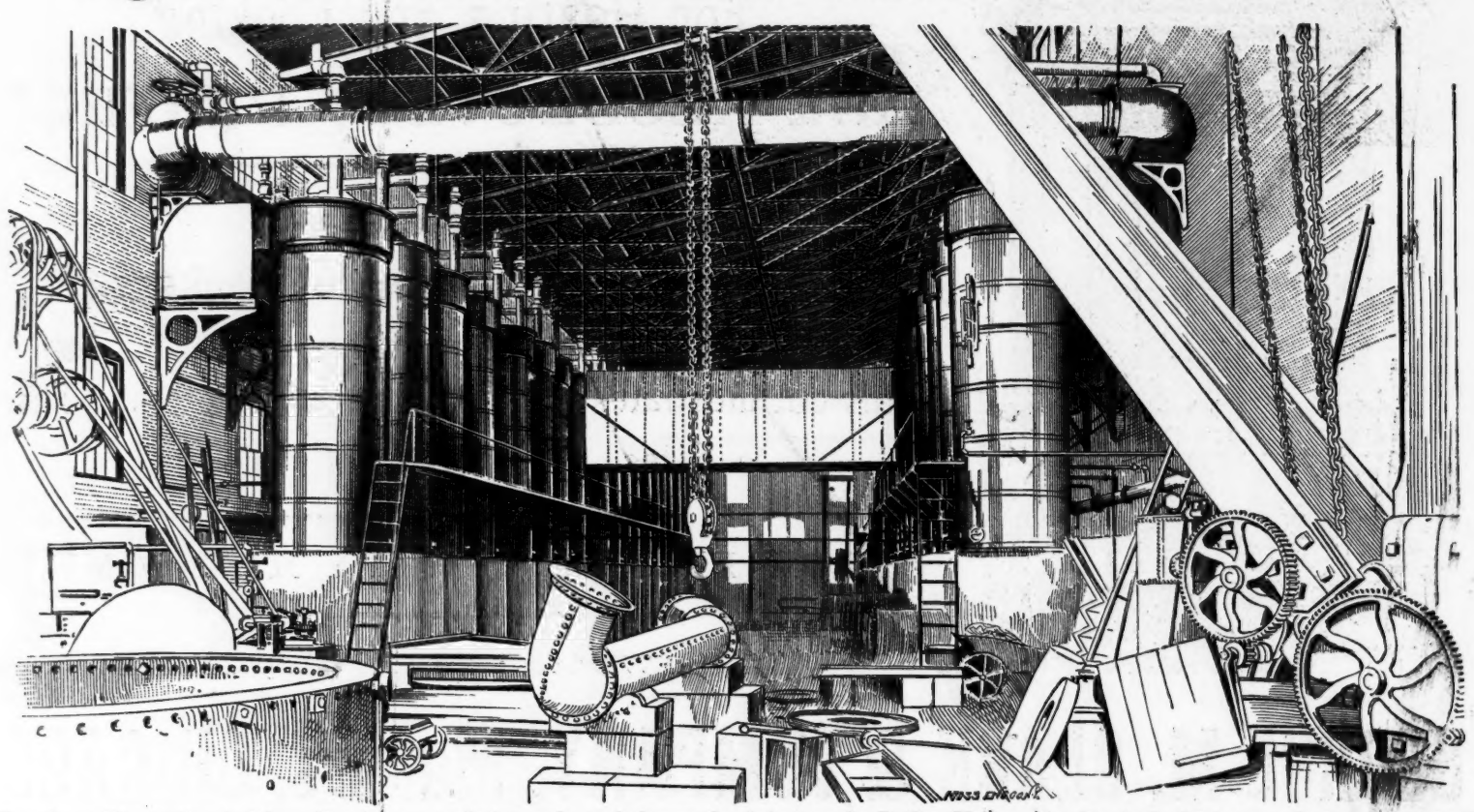

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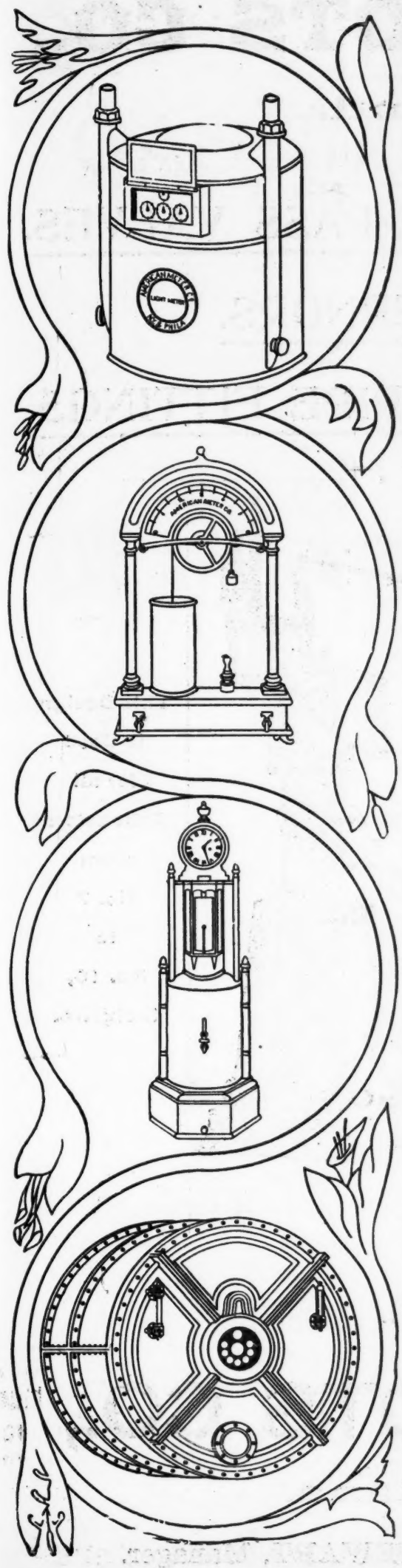

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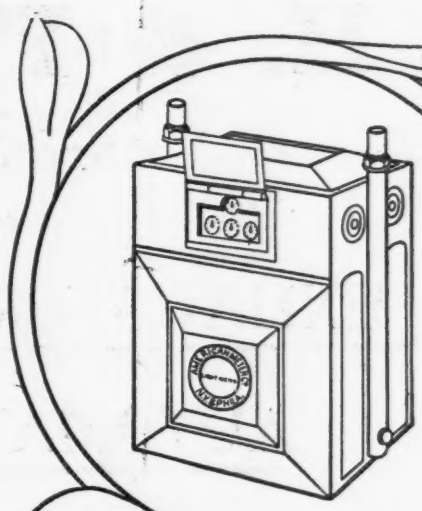
PUBLIC LIGHTING TABLE.

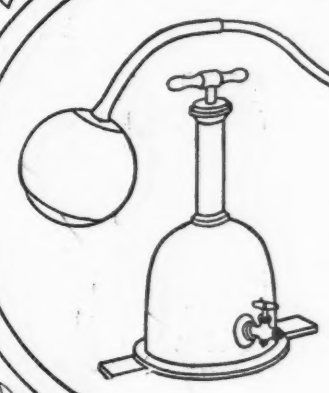
SEPTEMBER, 1896.

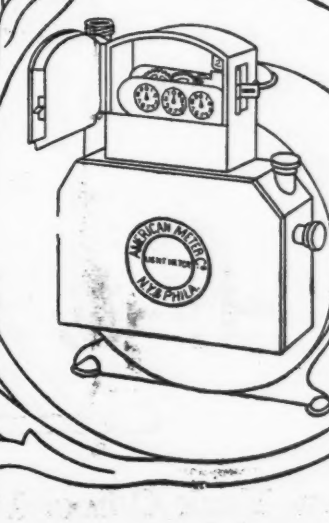
Day of Week.	Table No. 1. FOLLOWING THE MOON. Date.	Light.	Extinguish.	Table No. 2. NEW YORK CITY. ALL NIGHT LIGHTING. Light.	Extinguish.
				P.M.	A.M.
Tue.	1	7.00 PM	12.30 AM	6.30	4.20
Wed.	2	7.00	1.30	6.30	4.20
Thu.	3	7.00	2.40	6.15	4.30
Fri.	4	7.00	4.30	6.15	4.30
Sat.	5	7.00	4.30	6.15	4.30
Sun.	6	6.50	4.40	6.15	4.30
Mon.	7	6.50 NM	4.40	6.15	4.30
Tue.	8	6.50	4.40	6.15	4.30
Wed.	9	6.50	4.40	6.15	4.30
Thu.	10	6.50	4.40	6.05	4.40
Fri.	11	6.50	4.40	6.05	4.40
Sat	12	8.10	4.40	6.05	4.40
Sun.	13	9.00 FQ	4.40	6.05	4.40
Mon.	14	10.00	4.40	6.05	4.40
Tue.	15	11.10	4.40	6.05	4.40
Wed.	16	12.10 AM	4.40	6.05	4.40
Thu.	17	1.20	4.40	5.55	4.50
Fri.	18	2.20	4.40	5.55	4.50
Sat.	19	3.20	4.40	5.55	4.50
Sun.	20	No L.	No L.	5.55	4.50
Mon.	21	No L. FM	No L.	5.55	4.50
Tue.	22	No L.	No L.	5.55	4.50
Wed.	23	6.20 PM	7.20 PM	5.55	4.50
Thu.	24	6.20	7.50	5.40	5.00
Fri.	25	6.20	8.10	5.40	5.00
Sat.	26	6.20	8.50	5.40	5.00
Sun.	27	6.10	9.30	5.40	5.00
Mon.	28	6.10	10 20	5.40	5.00
Tue.	29	6.10 LQ	11 20	5.40	5.00
Wed.	30	6.10	12.20 AM	5.40	5.00

TOTAL HOURS LIGHTING DURING 1896.

By Table No. 1.	Hrs.Min	By Table No. 2.	Hrs.Min.
January	220.40	January	423.20
February	207.00	February	367.40
March	193.00	March	355.35
April	174.10	April	298.50
May	164.00	May	264.50
June	142.10	June	234.25
July	142 10	July	243.45
August	150.50	August	280.25
September	163.00	September	321.15
October	193.10	October	374.30
November	207.00	November	401.40
December	237.30	December	433.45
Total, yr.	2194.40	Total, yr.	4000.00







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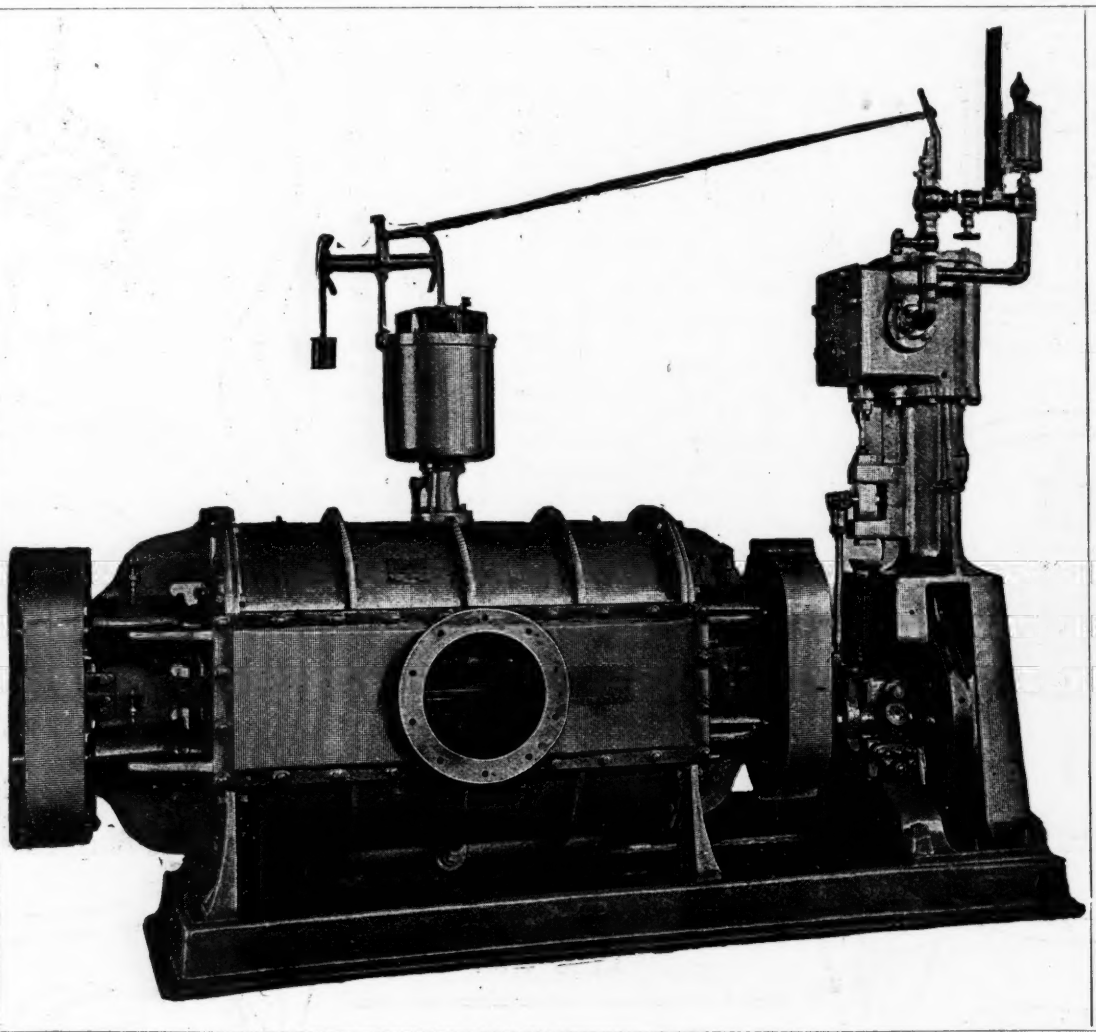

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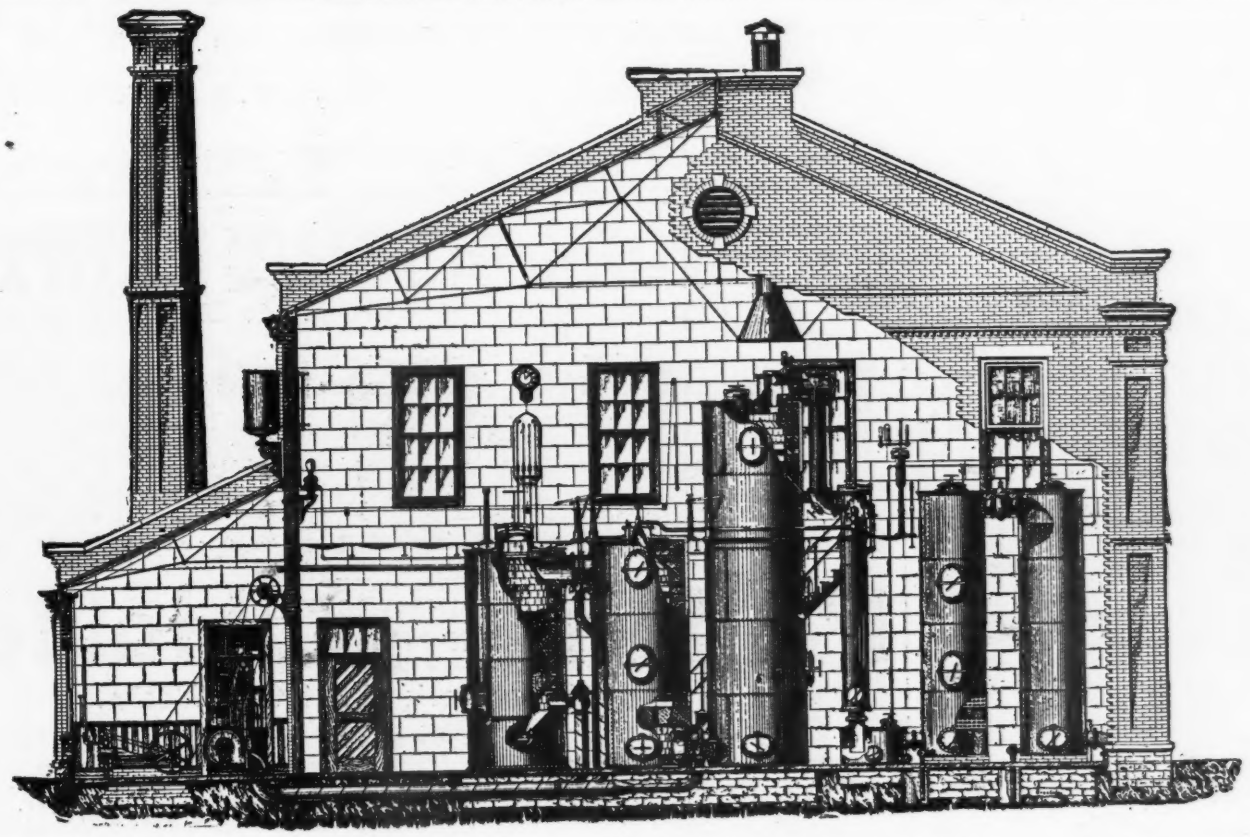

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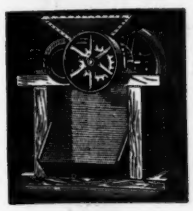

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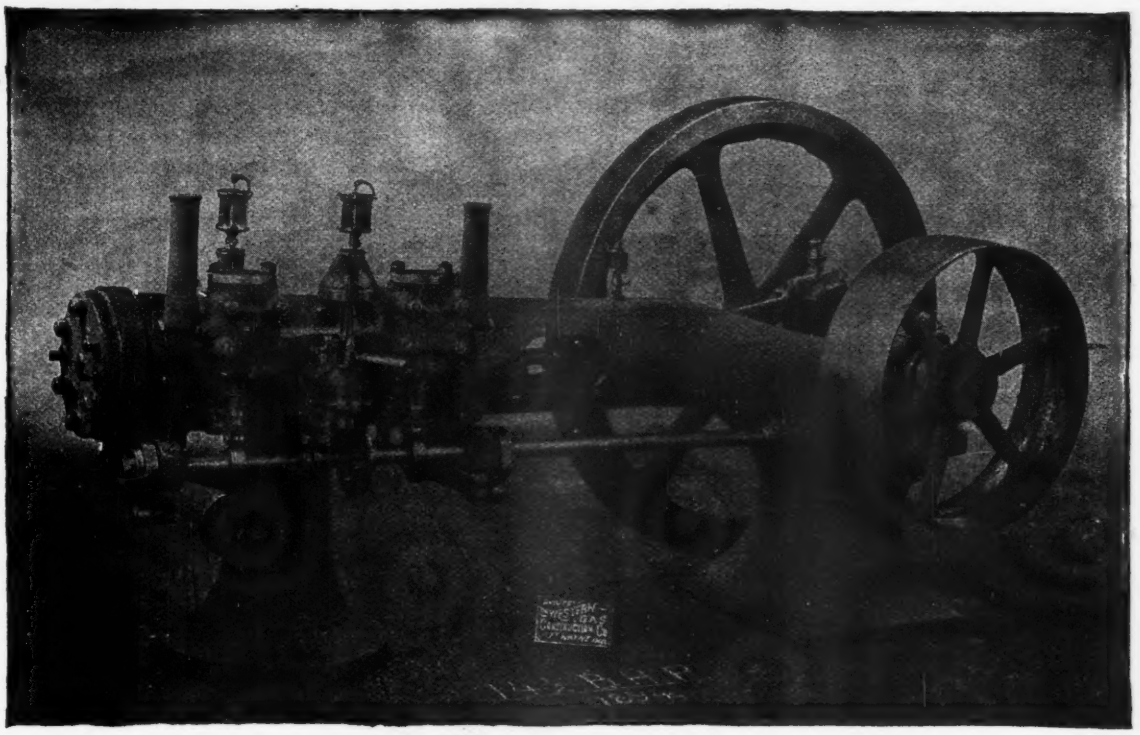

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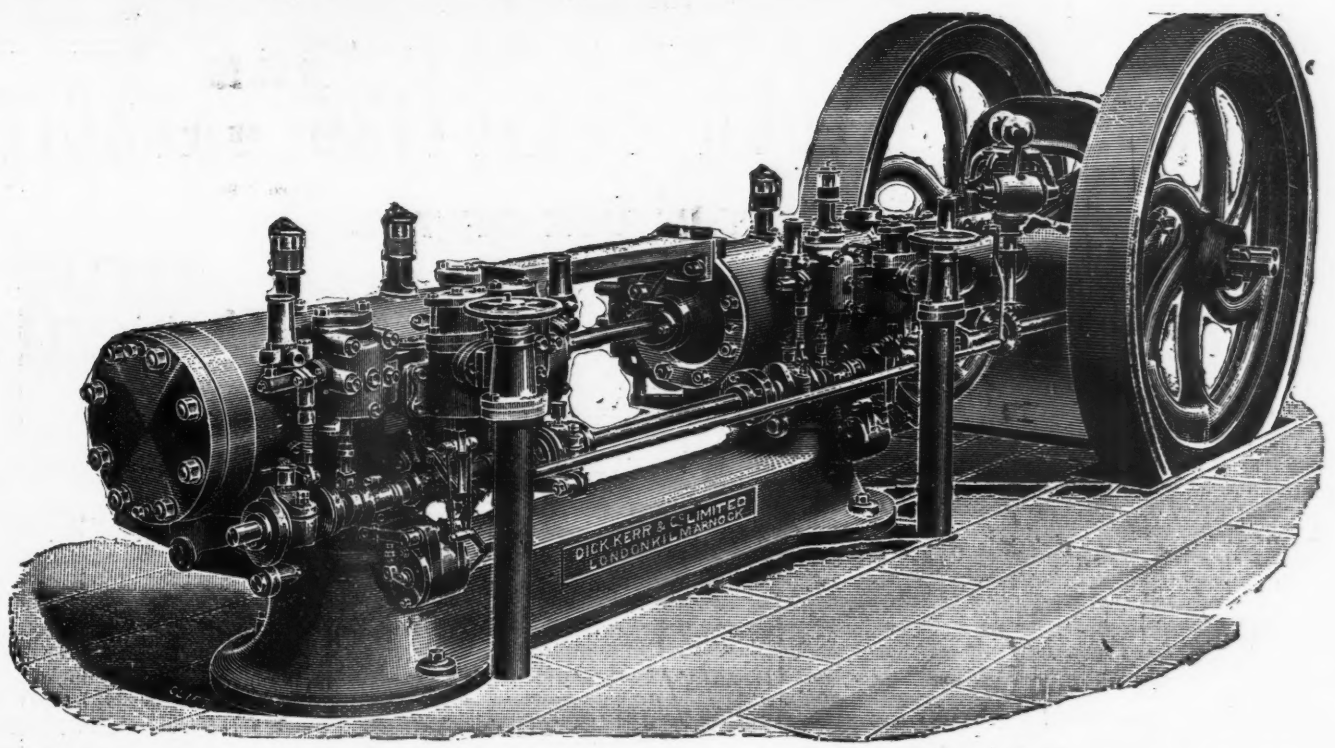

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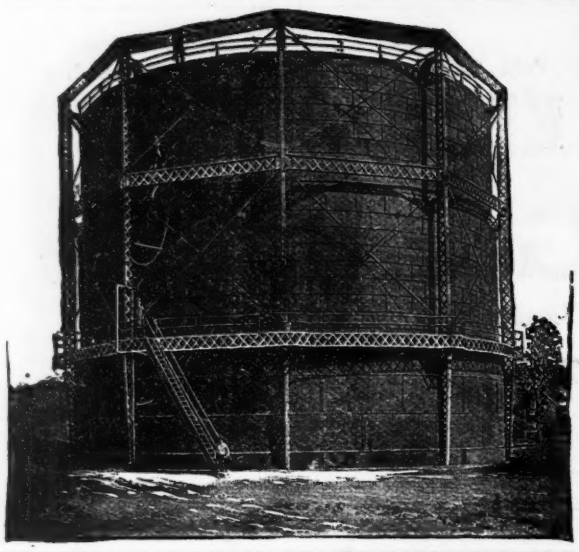

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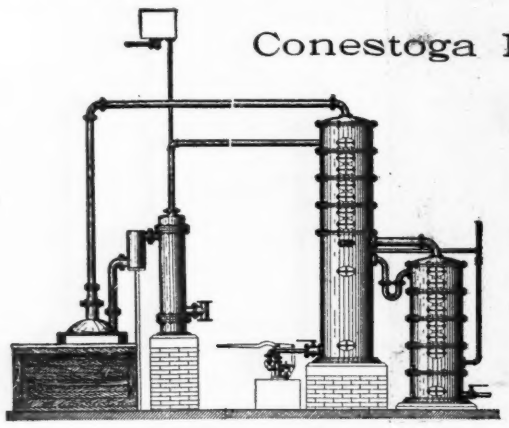

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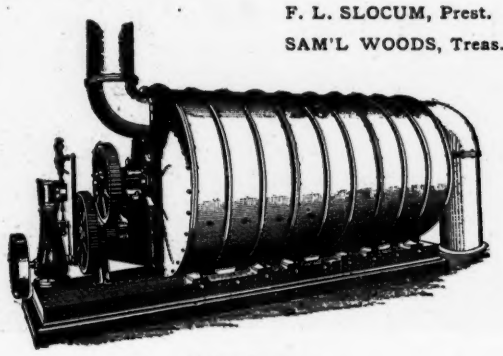

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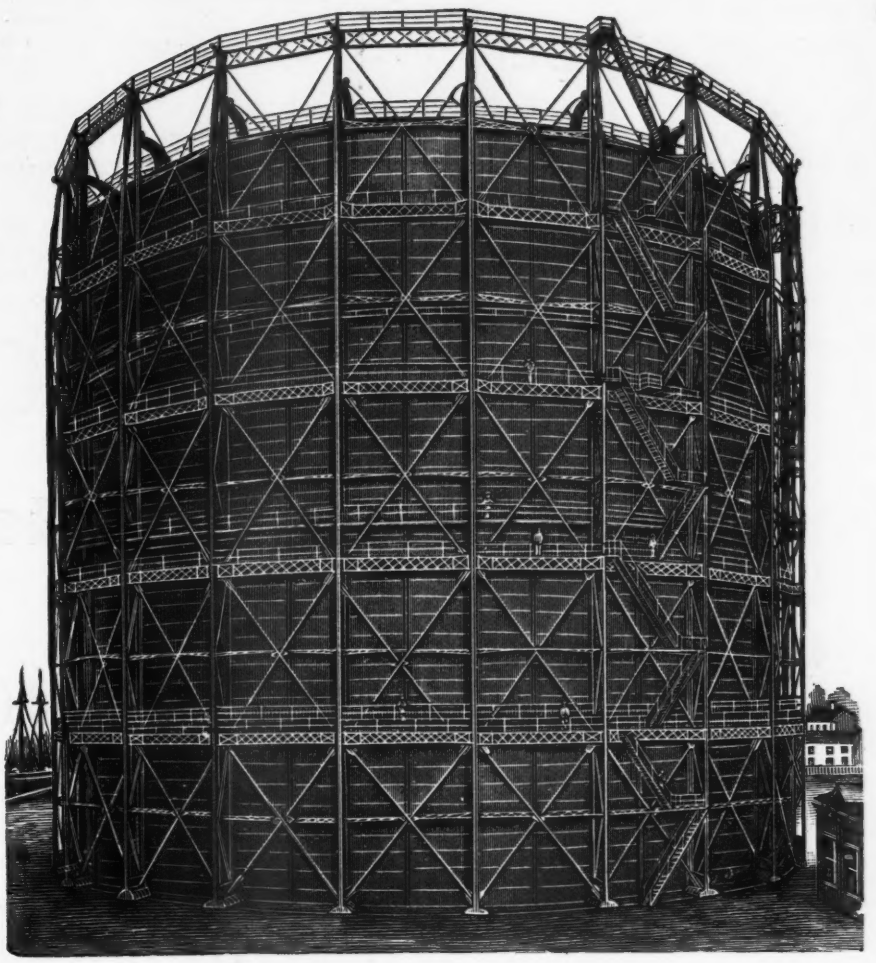

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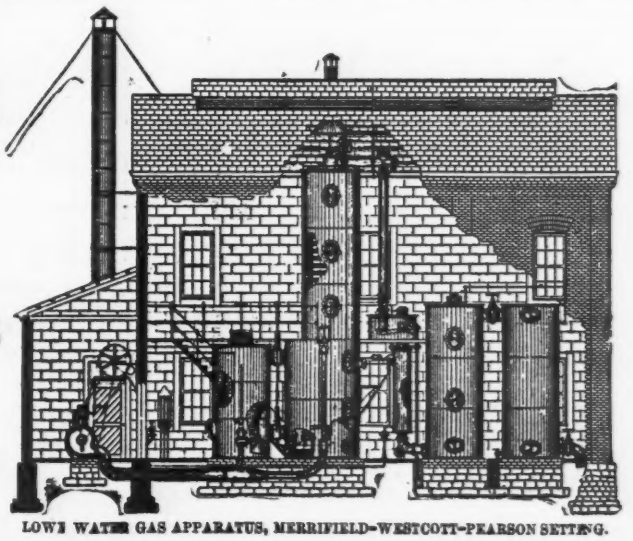

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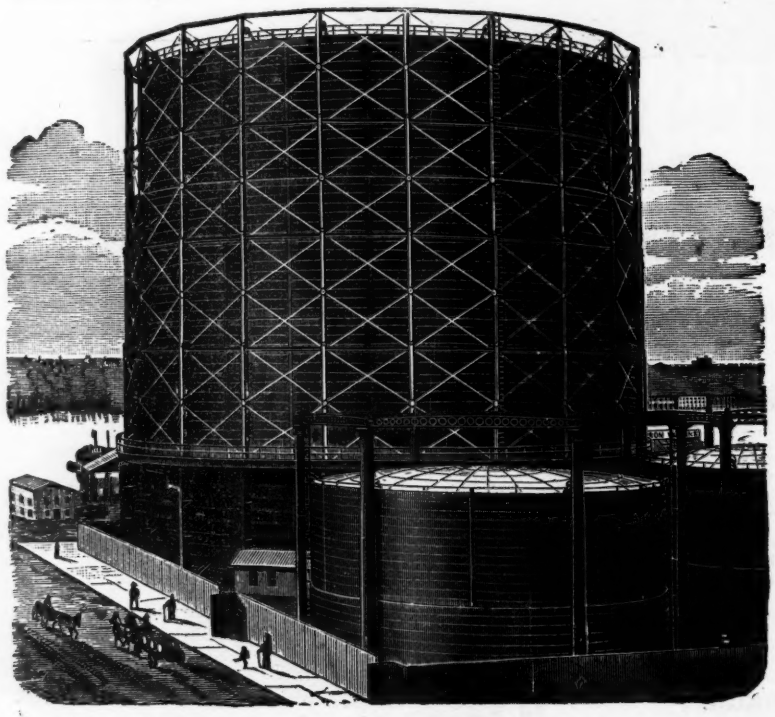

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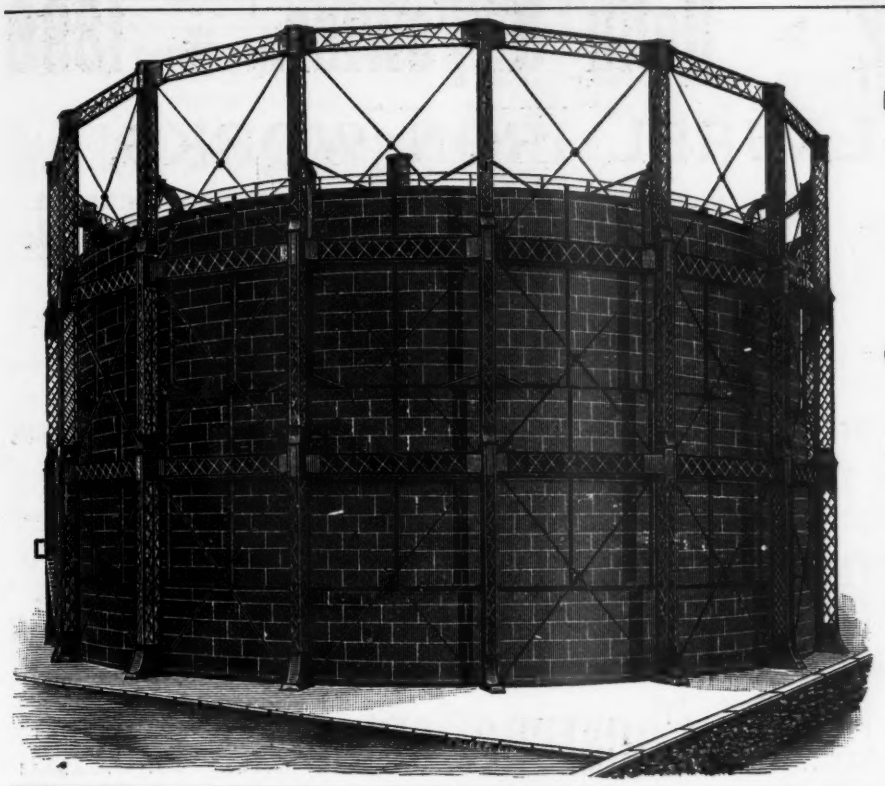

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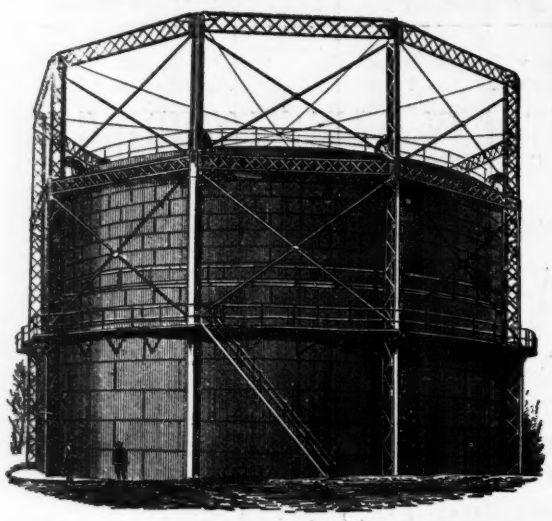

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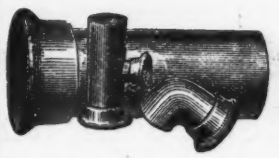

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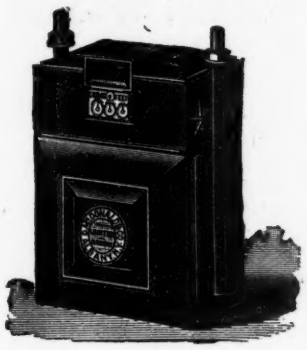

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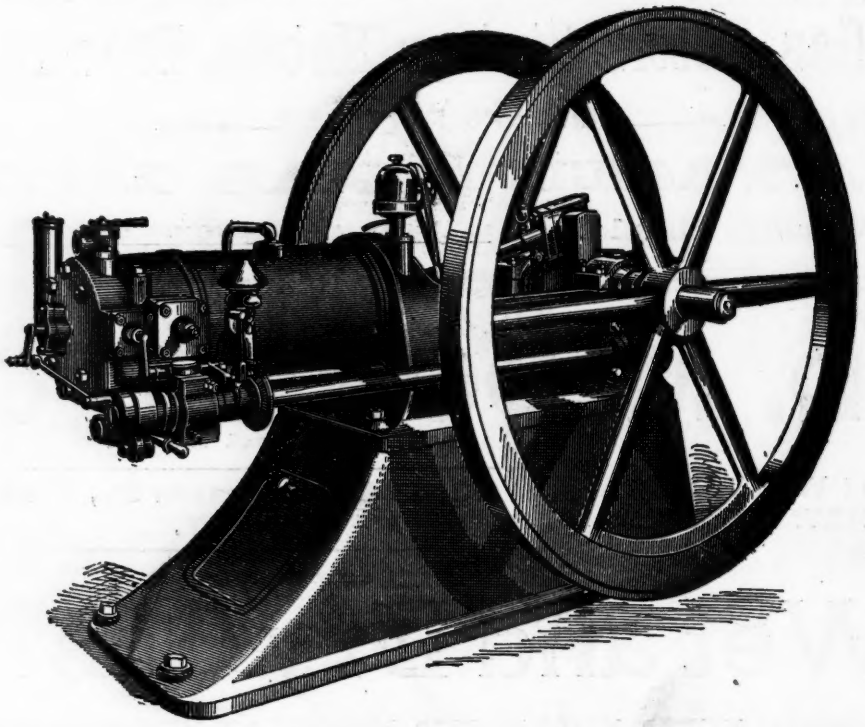

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